U 0280-1

ARIZONA BUSINESS

ARIZONA STATE UNIVERSITY
College of Business Administration
Glenn D. Overman, Dean

BUREAU OF BUSINESS AND ECONOMIC RESEARCH
Donald W. Jackson, Jr., Acting Director
Nelda S. Crowell, Editor of Bureau Publications
Gene Ann Beard, Administrative Assistant

BUREAU RESEARCH STAFF

Research Specialist:
Tom R. Rex

Faculty Research Associates:
Daniel C. Brenenstuhl
Jay Q. Butler
Robert T. Keim
Timothy D. Hogan
Lee R. McPheters
Assistant Director

RESEARCH AND PUBLICATIONS ADVISORY COMMITTEE

James Boyd,
Arizona State University, Chairman
Joseph Charnesky, Valley National Bank
Donald W. Jackson, Jr.
Arizona State University
John Linehan, Sperry Flight Systems
B. Scot Ober, Arizona State University
William Ruch, Arizona State University
John Sack, First National Bank of Arizona

Volume 27, Number 8

October, 1980

In This Issue

Arizona's Highways:
Crisis in the Making 3
David L. Shrock

Urban and Intercity Passenger
Transportation in Arizona 10
Martin T. Farris

Arizona's Railroad System 18
T.F. Griffth

Scheduled Air Transportation
in Arizona 25
Norman E. Daniel
Douglas Cochran

Arizona Business Scene —
Transportation: An Overview 31

A Survey of Arizona Business Conditions 33
Harold Fearon

Arizona Sales of Electrical Power 34

Arizona New Housing Starts:
Monthly Report, August 35

Arizona Building Permits:
Monthly Report, August 36

Maricopa County Monthly
Retail Food Prices, September 38

Metropolitan Phoenix
Consumer Price Index:
Third Quarter, 1980 39

ARIZONA BUSINESS (ISSN 0093-0717) is mailed free to Arizona residents. Persons wishing to be placed on the mailing list may do so by sending their name and address to the Bureau of Business and Economic Research, College of Business Administration, Arizona State University, Tempe, AZ 85281, (602) 965-3961.

Arizona State University is an affirmative action/equal employment opportunity institution and does not discriminate on the basis of sex, race, ethnic origin, creed, color, age, handicapped or veteran status in its programs or employment.

ARIZONA BUSINESS is published monthly (bimonthly during the summer) by the Bureau of Business and Economic Research, College of Business Administration, Arizona State University. Signed articles do not necessarily reflect the views of Arizona State University. Permission to reprint articles granted upon request. Second class postage paid at Tempe, Arizona 85281.

ARIZONA BUSINESS is available on microfilm and in xerographic copies from University Microfilms, Ann Arbor, Michigan 48106.

Report To The Reader

"Arizona's Transportation Dimension" was the theme of the 1980 Arizona Town Hall.

To provide the Town Hall participants with background information on the subject of transportation, the Arizona Academy, sponsor of the Town Hall, requested the College of Business at Arizona State University to develop a research report on the subject.

This issue of *Arizona Business* is devoted to some important aspects of that research. Four separate articles define the problems in highway financing, intercity and urban passenger transportation, as well as air and railroad transportation.

The first article by Dr. David Shrock, "Arizona's Highways: Crisis in the Making," presents a detailed analysis of Arizona's highway financing crisis. Dr. Shrock points out the complexity of the problem that involves funding through user charges as well as funding from general tax revenues — both of which are presently inadequate. He stresses that, "maintenance of an adequate road system is critical to Arizona's economy...The problem is how to generate the revenues necessary to cover the costs of desirable highway programs." The article outlines the recommendations of the Governor's Task Force, which demonstrate one approach to solving the problem.

The second article, "Urban and Intercity Passenger Transportation in Arizona," by Martin T. Farris evaluates the vehicles available for transportation, identifies criterion for evaluation of the system, and discusses the current degree of public commitment toward establishing a long-range transportation policy.

In the third article, "Arizona's Railroad System," Dr. T. F. Griffith points out that, "the rail mode is the most energy-efficient form of transport for many goods, especially long-distance movement of bulk goods...As energy efficiency becomes increasingly important...the railroads should benefit."

The final feature article in this transportation issue presents a view of air transportation, particularly as it relates to the recent deregulation. Dr. Norman Daniel and Dr. Douglas Cochran suggest that, "The overall development of commuter airline service in Arizona will depend on a wide variety of factors including economic conditions, safety records, and adequacy of airports.

Editor's Note: In the August/September issue, the headings for the Consumer Price Index and the Food Price Index on page 36 were inadvertently transposed. Also, the base for the Food Price Index should be 1967.

Arizona's Highways: Crisis in the Making

DAVID L. SHROCK

Editor's Note: This is the first of four major articles in this issue of Arizona Business *on the subject of transportation in Arizona. In addition, the "Arizona Business Scene" presents an overview of the transportation industry in the state. For details on the background of this research, see "Report to the Reader," on page 2 of this issue.*

A potential corollary exists between problems that have occurred in the nation's railroad system and problems that could occur in its system of highways. One of the major crises in recent United States transportation history has been the deterioration of a significant portion of the rights-of-way of many of the nation's railroads. This condition has resulted from inadequate spending for track maintenance and improvement, in a period of declining railroad profitability. This in turn has led to an increasing number of track-related railroad accidents, deteriorating service levels, and an ever larger price tag for bringing the roadbed up to standard.

A similar crisis could occur on the nation's highways. It is possible to defer maintenance of and additions to facilities for a seemingly indefinite period of time without significant deterioration of service; but this is a false impression. As time passes, the deterioration and the corresponding costs required to correct system deficiencies increase more and more rapidly.

At present, the funding available for roadway construction and maintenance is rapidly falling below the level required to adequately maintain the country's system of highways, roads, and streets. The purpose of this article is to present an overview of the way streets and highways are financed, the reasons that funding is beginning to lag behind required levels of expenditures, and the nature of the potential crisis in the state of Arizona.

The need for continued improvement of Arizona's highways, roads, and streets is widely recognized. The problem is how to generate the revenues necessary to cover the costs of necessary highway programs. This article discusses the highway system in general, highway classification, funding mechanisms, needs, and possible solutions.

David L. Shrock is Assistant Professor of Transportation in the Department of Marketing, College of Business Administration, Arizona State University.

IMPORTANCE OF ARIZONA'S HIGHWAY SYSTEM

A tribute to the quality of Arizona's existing system of roads and streets is that most of its citizens take them for granted. Unless the normal flow of traffic is interrupted by a freeway accident or by floods and the closing of major river crossings, highway travel will be considered a normal integral part of daily life. Only such interruptions, with their loss of convenience and increased vehicle operating costs, can effectively focus the public's attention on highway needs. Thus, the

relationship of Arizona's roads and streets to its economy and the daily life of its citizens is often overlooked.

The importance of this system to the state's economy cannot be overstated and can be seen to some extent in the distribution of energy use for transportation purposes, as shown in Table 1. National estimates show that 85 percent of intercity passenger movement is by auto and 25 percent of intercity freight movement is by truck. The similarities between the distribution patterns of energy use in Arizona and the United States suggest that these estimates do not understate the role of highway use in Arizona.[1] Indeed, one-third of the state's population is dependent on motor carriage for its surface movement of goods, and 404 Arizona communities, out of a total of 513, do not even receive rail service.[2] Furthermore, in those communities served by rail, virtually all shipments are handled by truck because the railroads, with the exception of AMTRAK's express service, have virtually eliminated small shipment service.

TABLE 1

DISTRIBUTION OF ENERGY USE BY TRANSPORTATION SEGMENT

Transportation Segment	*Arizona (Percentage)*	*United States (Percentage)*
Automobile	51.4	50.0
Pickup and other truck	29.2	24.0
Bus	0.3	3.0
Highway total	80.9	77.0
Other	19.1	23.0
Total	100.0	100.0

Sources: Arizona Transportation Energy: Usage Patterns (Phoenix: Arizona Department of Transportation (ADOT), December, 1977) cited in *Arizona State Highway System Plan—1978* (Phoenix: ADOT), pp. 34 and 37, and United States Department of Transportation statistics cited in Charles A. Taft, *Commercial Motor Transportation*, 6th ed. (Centreville, Md.: Cornell Maritime Press, 1980), p. 3.

Arizona has 38,420 miles of public roads and streets. Of this total, 6,362 miles are under state jurisdiction, 23,866 miles are under county jurisdiction, and 8,192 miles are under city jurisdiction. In addition, approximately 18,000 miles of roads are in national forests, parks, military reservations, and Indian lands and are the responsibility of federal agencies.[3]

In combination, these parts of the state's road structure provide the connecting links among homes, job centers, commercial centers, and recreation centers and provide the backbone for the state's overall transportation system.

HIGHWAY CLASSIFICATION BY USE

Arizona's highways, roads, and streets are classified in three categories, based on their principal uses. In the first category are roads classified as *arterials* — those routes accommodating long distance travel and heavy demand. Such roads, like the Black Canyon and Maricopa Freeways, provide the core for intercity travel and through travel or interregional travel in metropolitan areas. The second category includes roads classified as *collectors* because they serve to funnel traffic onto the arterials. The roads in the final category are classified as *local roads* and are used nearly exclusively for land access in rural, residential, commercial, and industrial areas. These usually fall under the jurisdiction of cities and counties. The state highway system includes most of the state's arterial highways and collector roads, including designated state highways and Arizona's segments of interstate and other United States highways.[4] These latter roads receive the greatest demand and generate more miles of travel per mile of roadway than do local routes. However, without the access provided by local routes, the entire structure would be ineffective.

HIGHWAY FUNDING MECHANISMS

Funding of road systems is generally accomplished in one of two ways. The first method involves the collection of so-called user charges, such as gasoline taxes, from those using specific categories of highways, and subsequent application of those tax revenues to the maintenance and construction of those highways.[5] Philosophically, this method suggests that the direct users of roadways benefit most, and therefore, should be responsible for funding road construction and maintenance. The second method involves financing highway expenditures from general tax revenues — income, sales, or property taxes, for example. Use of this financing method suggests that roadways are necessary for the public welfare and, therefore, should be paid for out of general funds. In practice, the first method has generally been applied to fund major intercity routes, such as the interstate and defense highway system; the second has been used to fund local routes, such as city streets and county roads.

A third method is also used occasionally for generating highway construction funds, most often at the local level. This method differs from the first two only in the way the initial funding for construction is raised. In this case, bonds are issued to generate required funds, and revenues from either user charges or general taxes are used to retire the debt. Principally, this changes the timing of

cash flows, making facility acquisition possible at an earlier date and at a potentially lower cost.[6]

To ensure that an adequate system of roadways capable of supporting commerce and the public welfare was developed, the policy of higher levels of government has been to provide support for the road building efforts of lower levels of government. For example, the federal government has provided aid to the states for construction of a limited number of intercity highways. The purpose of this support, which requires some matching state funds, has been to concentrate spending on highways that are essential to interstate commerce rather than to distribute the funds thinly for the support of many routes. The incentive for states to support federal roadbuilding goals has been the ability to construct more miles of highways for the same amount of in-state collected revenues. In all cases, the completed federal aid road systems have belonged to the states, which have become responsible for their maintenance.

The federal aid program began in 1912 with federal support amounting to one-third of the cost of construction of roads over which mail was carried. Over the years, the federal role has grown until support for roads included in the federal-aid system amounts to a minimum of 75 percent of the cost of construction, rising to a minimum of 90 percent for construction of segments of the interstate and defense highway system.[7] This funding is drawn from the highway trust fund monies generated through federally collected user charges and amounted to $6.4 billion for all purposes in 1978.[8] User charges contributing to the highway trust fund include the following:[9]

- A four-cent per gallon tax on gasoline, diesel, and special fuels (except gasahol and fuel used by buses).
- A ten-cent per pound tax on tires and inner tubes (except those for buses).
- A five-cent per pound tax on tread rubber (except that for buses).
- A 10 percent tax on the wholesale price of trucks and trailers.
- An 8 percent tax on the manufacturer's wholesale price on truck parts and accessories.
- A six-cent per gallon tax on lubricating oil used for highway purposes (except that used in buses).
- A tax of three dollars per pound on the total gross weight of vehicles rated at more than 26,000 pounds gross weight.

Additionally, many states, including Arizona, provide local governments with a share of funds generated from user charges levied at the state level. This reflects a recognition of local road and street user benefits from road use and results in a combination of the two previously discussed funding methods for the generation of local road and street support. In Arizona, funds collected in the highway user fund are allocated as follows: Arizona Department of Transportation (ADOT), 57 percent; cities, 17 percent; counties, 15 percent; and the Department of Public Safety (DPS), 11 percent. From July 1, 1978, through June 30, 1979, the highway user fund received over $205 million in revenues.[10] The user fund monies are generated from the following sources:[11]

- An eight-cent per gallon tax on all fuel used on highways.
- Registration fees of eight dollars per vehicle, seven dollars of which is directed to the highway user fund and one dollar of which is allocated to the counties to cover administrative costs.
- Motor carrier taxes involving a tax on the gross receipts of commercial carriers, including 2½ percent for freight carriers and 2¼ percent for passenger carriers.
- Other sources include title fees, operator licenses, and permits for excess size and weight operations.

Finally, funds are raised at the county and city levels. This funding is either used to provide the matching funds required for federally supported projects or is combined with monies from the Arizona highway user fund and applied to locally sponsored projects. Funds generated by county governments in Arizona between July 1, 1978, and June 30, 1979, and applied to transportation uses were $46.5 million; similar funds generated by city governments were $122 million. Of this, roads and streets constructed by subdividers accounted for $23.4 million of the county total and $43 million of the city total.[12] Receipts for road and street use were generated from the following sources (excluding local shares of the highway user fund):[13]

- Special property taxes collected from property owners for roads and streets (counties only).
- Assessments collected from property owners to pay for streets in improvement districts.
- Appropriations from general and public works funds to be spent on roads and streets.
- Contributions or the amount of money subdividers pay for constructing new streets in accepted subdivisions.
- Miscellaneous receipts from sales of equipment, payment for work done for others, and similar sources.
- Bond proceeds from bonds issued during that fiscal year.
- Fees received from the United States Forest Service (counties only).

HIGHWAY SYSTEM NEEDS

Arizona's reliance on its system of highways, roads, and streets certainly will not decrease as the state's population and economy continue to grow. Meeting the needs generated by this growth will require continued efforts in four major areas, as follows:[14]

- Construction of new roads required to support growth or improvements to existing facilities requiring expansion, such as new traffic lanes required to relieve congestion, or reconstruction, such as necessitated by bridge replacement.
- Maintenance of existing facilities to an adequate level of serviceability, including filling potholes, street sweeping, and traffic sign maintenance, among other things.
- Pavement preservation involving pavement sealing and overlay necessary to extend the life of existing roadways.
- Operating functions not directly attributable to construction or maintenance, including planning and traffic engineering functions.

The level of expenditures required to maintain and expand Arizona's highway system at an adequate level of serviceability are obviously open to debate; estimates of need levels are often based on subjectively established priorities. This level of needs has been carefully analyzed by the Arizona Department of Transportation, through its biennial transportation needs study; and assessments were made by the Governor's Arizona Transportation Task Force. This article uses the estimate developed by the latter group as a basis for discussion. Based upon the task force survey of local government and Arizona Department of Transportation needs for the next decade, the cost estimates shown in Table 2 were developed. These estimates, adjusted for the effects of inflation, include costs for each of the four categories described above and for the Department of Public Safety, which draws its monies from the highway user fund.

The importance of continued efforts to maintain and improve Arizona's highway, road, and street system, and the magnitude of that effort, are reflected in the following task force assessments:[15]

> Arizona's transportation system has been deteriorating for the past decade. Major segments of highways, streets and roads throughout the state have fallen into disrepair. Moreover, due to Arizona's rapidly expanding population, the transportation system's capacity has become increasingly inadequate. As a result, traffic congestion in urban areas has continually worsened... .
> The users of Arizona's highways have been living off the equity which has been built up through years of active construction programs. However, each year the drive to work takes a little longer than it did the year before. Potholes, ruts, and bumps in the roads and streets are becoming the rule rather than the exception.

TABLE 2

TRANSPORTATION NEEDS ESTIMATE
(Adjusted for Inflation)

Activity	*Share of Total (Percentage)*	*Amount (Billions)*
Construction	64	$10.5
Pavement preservation	10	1.7
Maintenance	9	1.5
Operations	13	2.1
Department of Public Safety	4	0.7
Total ten-year need	100	$16.5

Source: Final Report and Recommendations, State Transportation Policy Task Force (March 28, 1980), p. 5.

Such statements paint a bleak picture of Arizona's highways, but that picture could become even bleaker if an active adequately funded program of road and street maintenance and construction is not actively pursued in the next decade. Roads and streets, in which pavements are not adequately maintained through pavement preservation programs, may require virtual reconstruction at much higher costs. Construction delays in times of increasing inflation will result in more expensive roads.

In addition, many relatively hidden costs accrue to the average citizen resulting from poor road maintenance and delayed system expansion and improvement. One example of these costs is cited in a study performed by the Tucson-based Citizen Advisory Committe for Transportation Update (CACTU). That analysis provides estimates of increased motorist costs resulting from eight years of arterial street deterioration without remedial action. It suggests that increases in congestion, at present service levels, would cost individual motorists $250 per year in additional fuel costs alone and that a 25 percent increase in current traffic volume would add 200 hours of travel time per year for individuals.[16]

The costs of poor roads are well documented by cost studies performed to evaluate the benefits to be gained from surfacing improvements. A related study, released in February, 1980, by the Road Information Program, estimates that existing badly worn roads cost the average Arizona motorist $408 per year in wasted fuel, excessive tire wear, and extra vehicle repairs. Not included in this estimate are costs arising from traffic congestion, narrow lanes, antiquated bridges, and accidents.[17] From an even casual assessment of studies such as those cited here, it is

apparent that maintenance of an adequate road system is critical to Arizona's economy and that continued support of system improvement is desirable.

THE PROBLEM

The need for continued improvement of Arizona's highways, roads, and streets is not the problem. The need for continued support is both highly evident and easily justified. The problem is how to generate the revenues necessary to cover the costs of desirable highway programs. In recent years, the gap has been growing between the levels of expenditures required to meet recognized needs and available funding. The causes of this widening gap stem from four basic areas.[18]

First, revenues at the federal and state level have generally been tied to user charges based on levels of use. For example, gasoline tax revenues increase only as the consumption of gasoline increases. During the 1970s this occurred at about a 5 percent rate of growth. However, as increasing fuel prices and questions about fuel availablity have led to a reduction in automobile use and a shift to more fuel efficient vehicles, revenues from many user charges have either been unchanging or have increased at very slow rates.

Second, at a time when growth in user fund revenues has slowed, highway and street construction costs have been inflating at a substantially faster pace than costs in other sectors of the economy. Indeed, the cost of constructing transportation facilities increased 200 percent during the past decade.[19]

Third, much of the nation's highway and street system has now matured and requires increased upkeep to maintain the high levels of service the public has come to expect. For example, the United States Department of Transportation estimated that 4 percent of the interstate system mileage needed major pavement rehabilitation or reconstruction by 1975. By 1978, this estimate had risen to 10 percent of the total system, with 2,000 additional miles of highway reaching design age each year.[20] Similar situations are developing on many road and street networks. Additionally, road maintenance costs have been subject to the same inflationary pressures as have highway construction costs.

Finally, local governments have not been immune to pressures for budget constraints or the effects of inflation on construction costs. As a result, local funding has become increasingly inadequate. In many cases local governments have sought to shift more of the burden for highway finance to the state and federal governments.

THE SOLUTION

When available funding lags behind needed expenditures, two solutions are possible: reducing the level of needs or increasing the level of revenues. In practice, a combination of these two possible solutions is generally most desirable and was the approach suggested by the Governor's task force. Based on an evaluation of the state's needs, the task force recommended the ten-year program presented in Table 3. The position taken in developing this program is reflected in the following statement:[21]

TABLE 3

RECOMMENDED TEN-YEAR ARIZONA TRANSPORTATION PROGRAM
ADJUSTED FOR INFLATION
(Billions)

		Investment Levels						
				State Financing Levels				
Needs Category	*Ten-Year Needs*	*Federal Aid*	*Local Funds*	*Net Bond Proceeds*	*State Revenues*	*Total*	*Total Investment*	*Percentage of Needs Met*
Construction	$10.5	$1.2	$0.7	$0.8	$1.8	$2.6	$4.5	43
Pavement preservation	1.7	0.1	—	—	1.2	1.2	1.3	76
Maintenance	1.5	—	—	—	1.2	1.2	1.2	80
Operations	2.1	—	—	—	1.3	1.3	1.3	62
Department of Public Safety	0.7	—	—	—	0.7	0.7	0.7	100
Total	$16.5	$1.3	$0.7	$0.8	$6.2	$7.0	$9.0	54

Note: All figures are in billions of dollars.
Source: Final Report and Recommendations: State Transportation Policy Task Force (Phoenix: March 28, 1980), p. 10.

Although the task force recognizes the legitimacy of the full $16.5 billion dollars of needs throughout the state, it was concluded that meeting the current backlog of needs and providing for Arizona's explosive economic growth represents tasks that far exceed the capacity of the state's present financing system. Time-consuming planning process s, limitations on manpower and materials, legal and political constraints, all combine to serve as an effective barrier to implementation of a transportation program which meets 100 percent of the task force recognized needs.

Fortunately, funding Arizona's transportation requirements need not be viewed as an all or nothing proposition.

The recommendations of the task force include a major restructuring of the state's system for financing transportation programs. These recommendations fall into three areas and are presented in the following paragraphs. They demonstrate one approach to actions that may be required to support Arizona's highway, road, and street systems in the 1980s.[22]

1. Index the per gallon motor fuel tax to Arizona personal income, resulting in an immediate increase of the tax to 15 cents per gallon and further increases raising the tax to 43 cents per gallon in the 1989-90 fiscal year. This 1 percent level is approximately the relationship maintained from 1960 through 1970, but which had fallen to 0.57 percent by 1980.

2. Increases in selected motor vehicle related fees such as increases in registration fees from $8 to $16 per vehicle, in operator license fees from $5 to $10 per license, and in commercial vehicle fees of 50 percent, including registration.

3. Issuance of revenue bonds having ten-year net proceeds of $800 million. This would require legislative approval and would result in an outstanding cost to retire the bonds, including principal and interest of $2.3 billion at the end of the decade.

Obviously these are not the only possible solutions to the problem. A number of alternative solutions were analyzed in a report prepared by the three state universities in 1978, including modification of gasoline use tax levels, revised motor vehicle tax schedules, new sales taxes on auto related sales, taxes on private sales of used automobiles, increased operator license and motor vehicle registration fees, revised for-hire motor carrier operating taxes, increases in property taxes, and bonding. This report was one of the inputs considered during unsuccessful discussion of the highway funding issue in the 1980 session of the state legislature.[23]

More recently, the Governor and legislative leaders have been studying a three-point program to meet Arizona's highway needs through: (1) passage of a five-cent hike in the state's gasoline tax, (2) development of a new source of finance, such as a 1 percent increase in the state sales tax, to fund new road or transit projects, and (3) grant local government tax authority, either at the county level or through the creation of transportation authorities, to generate funds for road and transit projects.[24] The difficulty lies in reaching a consensus on how much money is really needed and how it should be raised.

However, total lack of action while seeking a solution should not be considered a viable alternative. Increases in funds for highway-related programs are urgently needed. The revenue base for the Arizona Highway User Fund has fallen to the point where it is incapable of maintaining the existing highway system. Revenues over the next decade have been estimated at $2.6 billion while maintenance of the existing system would require more than $4 billion.[25] It is clear that something must be done, it is not clear what should be done.

CONCLUSION

The purpose of this article has not been to recommend a particular course of action to avoid the state's impending highway system crisis. Rather, its purpose has been to point out the magnitude of the state's highway financing problem and the overwhelming need for action now. If Arizona's economy is to retain its reliance on the highway system, that system must be both maintained in good condition and improved and expanded as necessary to support the state's continued growth. The financing required to support the Arizona system of streets, roads, and highways can be obtained in many acceptable ways. At present, the citizens of Arizona are faced with a controversial problem; without appropriate action, that problem will soon develop into a crisis.

NOTES

[1]Based on data accumulated by the Transportation Association of America and published in its *Transportation Facts and Trends* reports prepared quarterly. This information represents passenger-miles and ton-miles generated by passenger and freight movement, respectively. In addition, the same source notes that nearly 40 percent of all tons of freight are moved by truck.

[2]*1977 Commercial Atlas and Marketing Guide*, Rand McNally Co., and Prepay Station List 92, Station List Publishing Co., as cited in *Arizona Moves by Truck* (Phoenix: Arizona Motor Transport Association), p. 23.

[3]*Investments in Arizona's Streets, Roads, and Highways: Biennial Statewide Transportation Needs Report — 1980* (Phoenix: Arizona DOT, January, 1980), p. 13.

[4]*Arizona State Highway System Plan — 1978* (Phoenix: Arizona DOT), p. 75.

[5]In many cases, funds collected from one source will be used to support a separate but similar type of highway. For example, federal user charges are collected from users of existing highways but are used principally to support the construction of new highways.

[6]Bonding is often used to generate funds for bridge or tunnel construction, and the revenues collected from tolls charged for facility use are applied directly to service the bond issue.

[7]For a history of this development see Charles A. Taff, *Commercial Motor Transportation*, 6th ed. (Centreville, Md.: Cornell Maritime Press, 1980), Ch. 2 and 3, among others.

[8]*Highways, Safety, Transit: A Summary of the Surface Transportation Assistance Act of 1978* (Washington, D.C.: Highway Users Federation).

[9]Taff, p. 66.

[10]*Investments in Arizona's Streets, Roads, and Highways: Biennial Statewide Transportation Needs Report — 1980*, p. 9.

[11]*Arizona State Highway System Plan — 1978*, p. 117.

[12]*Road Finances and Mileage Data of the Counties and Incorporated Places in Arizona: Fiscal Year Ending June 30, 1979* (Phoenix: Arizona DOT, June, 1980), pp. 2 and 40.

[13]*Ibid.*, Definitions.

[14]*Investments in Arizona's Streets, Roads, and Highways: Biennial Statewide Transportation Needs Report — 1980*, pp. 2 and 3.

[15]*Final Report and Recommendation: State Transportation Policy Task Force* (Phoenix: March 28, 1980), pp. 4 and 5, respectively.

[16]*Ibid.*, p. 6.

[17]From a report of The Road Information Program (TRIP), Washington, D.C., as cited in "Bad Roads Cost Motorists in Wasted Fuel, Auto Wear," *Tempe Daily News* (February 5, 1980), p. 2.

[18]Further reading on this topic may be found in *State Highway Finance* (Washington, D.C.: Transportation Research Board, National Academy of Sciences, April, 1980).

[19]*Final Report and Recommendations: State Transportation Policy Task Force*, p. 2.

[20]"Completed Interstate System Seen 'Impossible' by DOT," *Transport Topics* (August 4, 1980), p. 6.

[21]*Final Report and Recommendations: State Transportation Policy Task Force*, pp. 10 and 11.

[22]*Loc. cit.*

[23]See *Arizona Highways: The Ways and Means for Financing* (Prepared by the state universities for the Arizona Legislature, December 31, 1978).

[24]"State Grapples with Transportation Costs," *Arizona Republic*, pages A1 and A16. This article also points out the potential impact of the so-called Heuisler proposal to roll back property values to 1975 levels. If this proposition passes, the legislature will be reluctant to increase taxes for any purpose, compounding the highway funding problem.

[25]*Final Report and Recommendations: State Transportation Policy Task Force*, p. 2.

Urban and Intercity Passenger Transportation in Arizona

MARTIN T. FARRIS

The movement of people in Arizona is an important issue, particularly in a state known for long distances between towns and a sizable concentration of population in Phoenix and Tucson. Many policy issues and public decisions involve passenger transportation matters. In approaching these issues, one must understand the dimensions and characteristics of the state's passenger transportation system and must have some set of criteria for evaluation and decision making. Hence, the purposes of this article are to provide that understanding and to suggest some evaluation criteria and policy modifications.

DIMENSIONS OF THE PASSENGER TRANSPORTATION SYSTEM

Essentially passenger transportation has two aspects: the vehicle, and the way. Since Arizona's highways and streets are considered in another article in this series, this article deals with the vehicle.

Dominance of Private Automobiles

The dominance of the private automobile in Arizona transportation is illustrated in Tables 1 and 2. Table 1 presents both motor vehicles registered and population by counties for 1979. For the state as a whole, there is one passenger car for every 2.11 persons. However, the private pickup truck is also an important factor in Arizona transportation; 252,048 private and non-commercial pickups were registered in 1979; when these are added to passenger cars, the ratio drops to 1.76 persons per vehicle in Arizona.

The growth in passenger cars as compared to population is presented in Table 2, which shows that over the decade the number of total passenger cars registered has grown faster than the population, with 2.22 persons per car in 1969 and 2.09 persons per car in 1979. This is in spite of the somewhat changed growth pattern after the "high point" of 1.98 persons per car just before the first energy crisis in 1973. Obviously, the passenger car dominates as a means of transportation in Arizona.

Motorcycles

Another type of private passenger transportation is the motorcycle. Currently, slightly over 3 percent of the registered vehicles in the state are motorcycles—up from just over 2 percent ten years ago. Of these 73,260 motorcycles, 54.8 percent (40,173) are registered in Maricopa County, and 15.5 percent (11,363) are registered in Pima County. It is conceivable that if the energy crisis deepens, the popularity of the motorcycle and bicycle might increase markedly.

For-Hire Intercity System

A further dimension of the state's passenger transportation system is the for-hire system running between

---

In the effort to serve the maximum number of people at the lowest possible cost with the least amount of environmental disruption, many trade-offs are possible in the field of passenger transportation.

Martin T. Farris is Professor of Transportation in the Department of Marketing, College of Business Administration, Arizona State University.

TABLE 1

PRIVATE PASSENGER CAR AND PICKUP REGISTRATIONS AND POPULATION BY COUNTY 1979

County	Private Passenger Cars	Private Pickups	Total Cars and Pickups	Population	Persons Per Car	Persons Per Car and Pickup
Apache	9,423	8,132	17,555	49,250	5.23	2.81
Cochise	38,334	10,113	48,447	82,275	2.15	1.70
Coconino	27,942	10,479	38,421	81,550	2.92	2.12
Gila	17,273	7,795	25,068	35,825	2.07	1.43
Graham	8,094	3,609	11,703	21,825	2.70	1.86
Greenlee	4,924	2,416	7,340	11,825	2.40	1.61
Maricopa	722,573	111,963	834,536	1,453,500	2.01	1.74
Mohave	29,374	7,007	36,381	49,050	1.67	1.35
Navajo	18,929	11,018	29,947	73,675	3.89	2.46
Pima	242,389	43,147	285,536	521,325	2.15	1.83
Pinal	38,448	11,950	50,398	91,450	2.34	1.81
Santa Cruz	10,510	2,493	13,003	19,625	1.87	1.51
Yavapai	36,482	11,652	48,134	61,650	1.69	1.28
Yuma	41,482	10,274	51,756	78,125	1.88	1.51
Total	1,246,177*	252,048**	1,498,225	2,630,975	2.11	1.76

*Excludes 13,689 government-owned passenger cars.
**Excludes 6,709 government-owned pickups.
Source: Arizona Department of Transportation, Motor Vehicle Division, Arizona Department of Economic Security, Population Statistics Unit; ratios calculated.

TABLE 2

POPULATION PER PASSENGER CAR IN ARIZONA 1969-1979

Year	Population	Passenger Cars*	Ratio
1969	1,737,000	781,255	2.22
1970	1,775,399	827,579	2.14
1971	1,869,000	891,556	2.10
1972	1,975,000	970,403	2.03
1973	2,075,000	1,047,039	1.98
1974	2,157,000	1,079,927	2.00
1975	2,207,000	1,062,896	2.08
1976	2,270,000	1,072,443	2.12
1977	2,365,000	1,119,347	2.11
1978	2,547,000	1,192,021	2.14
1979	2,631,000	1,259,866	2.09

*Includes government-owned passenger cars.
Source: Valley National Bank, *Arizona Statistical Review*, September, 1979, p. 6 and p. 40; ratios calculated.

cities. The dominant means of for-hire intercity passenger transportation in the state is the intercity bus. The Arizona Department of Transportation (ADOT) reports that 133 cities and towns in Arizona are served by intercity buses through eleven bus lines. In addition, numerous tour companies, airport limousine services, and special worker buses operate in Arizona.

The two dominant intercity bus lines are Greyhound Lines and Continental Trailways. While good comparative data are not available, the following survey of the eleven intercity bus systems gives some idea of the size and extent of bus service.

Greyhound Lines, part of a nationwide system, is the largest intercity bus company in the state, operating 4,353 buses in 1978 (forty-foot buses carrying forty-three passengers). This firm produced 241,958,254 passenger miles[1] and 400,496,459 seat miles in Arizona in 1978,[2] and produced approximately 27,200 daily vehicle miles in Arizona.

Continental Trailways, also part of a national system, operated 2,000 buses, produced approximately 9,600 daily vehicle miles in Arizona. Trailways serves Phoenix, Tucson, Flagstaff, Kingman, Holbrook, and Williams and other towns along its routes, and maintains terminals in Phoenix, Tucson, and Flagstaff.

Arizona Bus Lines operates twice daily between Phoenix and Ajo and produced 471,711 passenger miles and 115,692,306 seat miles in 1978.[3]

Nogales-Bisbee Stage Company operates between Tucson and Sierra Vista/Fort Huachuca on a twice-daily schedule[4] and produced 114,614 passenger miles and 5,527,858 seat miles in 1978.

Citizens Auto Stage operates nine daily round trips between Tucson and Nogales. In 1978 Citizens Auto Stage traveled 1,206 vehicle miles per day and hauled an average of 419 passengers per day, producing 739,825 passenger miles and 20,691,975 seat miles.[5]

Sun Valley Bus Lines, a subsidiary of Greyhound Corporation, provides service from Phoenix to Parker and Lake Havasu City as well as urban service from Mesa to Phoenix via Tempe. Sun Valley operated 2,506,642 vehicle miles in 1979.[6]

Navajo-Hopi Tours serves Flagstaff, Williams, and the Grand Canyon.

Mogollon Stage Lines serves Phoenix, Payson, and Winslow via Mesa.

White Mountain Passenger Lines serves Show Low, Whiteriver, Lakeside, Pinetop, McNary, Alpine, St. Johns, Concho, Holbrook, Taylor, Snowflake, Heber, Payson, and Globe.

Las Vegas-Tonopah-Reno Stages provides service from Phoenix to Kingman, Las Vegas, and Reno.

Yuma Bus Company runs three times a day from Yuma to Somerton and San Luis.

Nevertheless, parts of the state have no public transportation. In northeastern Arizona, the Navajo and Hopi Reservations, which occupy one-tenth of the land area of the state, have no public transportation nor does the large Papago Reservation in south central Arizona. Sparse settlements and severity of weather in northeastern Arizona discourage private carriers.

The Arizona Department of Transportation reports that approximately 8 percent of Arizona's 2,200,000 population is without intercity bus service. This includes the towns of Clifton (a county seat), as well as Elfrieda, Winkelman, Bonita, Colorado City, Catalina, Kearny, Mammoth, San Manuel, Bagdad, and Patagonia.

Urban Transportation Systems

A final dimension of the passenger transportation system in the state is the urban transportation systems. Of course, the dominant means of urban transportation, as well as intercity transportation, is the private automobile. Excluding the private automobile, the urban system is composed of urban transit systems, publicly owned demand-responsive systems, taxicabs, specialized transit, and bicycles.

Urban transit systems are characterized by at least one fixed route with a published schedule and regular frequency of service within an urban area. In Arizona six systems meet these criteria and are located in the metropolitan areas of Phoenix, Tucson, Prescott, Nogales, Douglas, and Sun City. Data on each are contained in Table 3.

Prescott-Whipple Stage, which covers approximately 70 percent of the city of Prescott, operates four buses and carries an average of 130 persons per day. A total of 22,240 passengers were carried in the first six months of 1979. The Prescott-Whipple Stage, privately owned and operated, receives no subsidy and operated at a loss of $6,315 for the first half of 1979.

Soto Bus Company operates in Nogales and Chula Vista with four buses at a fifty-cent fare, carrying an average of 551 persons per day. The service carried 71,688 total passengers in the first six months of 1979 and receives no subsidy.

Douglas Bus Company provides service within the city of Douglas and to the Mexican border using two buses. They carry approximately sixty passengers per day.

Sun City Bus Line, operated by Del Webb Development Company within Sun City, uses four buses and carried 9,723 passengers during the first six months of 1979 (an average of sixty-seven passengers per day). The system is operated for the convenience of Sun City residents and operated at a $61,950 deficit for the first half of 1979. No subsidy is involved from public funds.

The Phoenix Transit System operates in metropolitan Phoenix. Data for the year ending January, 1979, are included in Table 3. In 1978, Phoenix Transit carried over 9 million passengers at a cost of ninety-nine cents per passenger. According to the July, 1980, monthly report, Phoenix Transit carried an average of 42,127 passengers per day in the fiscal year ending June, 1980, and is experiencing remarkable growth in ridership. In September, 1979, thirty-seven new advanced design buses were put into the system and new routes were instituted while old routes were extended. In spite of the greatly increased ridership, the system operates at a loss ($5.7 million in 1978) and in December, 1979, had revenues of $358,176 but expenses of $924,988 for a loss of $566,812. Substantial grant money from the federal government has been utilized by Phoenix Transit in its program of upgrading and expanding the system.

Tucson Transit (SunTran) took over the operation of Old Pueblo Transit in September, 1978, and merged it into the existing SunTran system. In 1978, SunTran carried over 7.8 million passengers which averaged over 29,000 passengers a day at a cost of sixty-six cents per person.

TABLE 3

URBAN TRANSPORTATION IN ARIZONA 1978-1979

	Number of Vehicles	*Total Vehicle Miles*	*Total Passengers*	*Total Cost*	*Total Revenue*	*Deficit*	*Average Person Trips Per Day*	*Cost Per Mile*	*Cost Per Passenger*
Phoenix Transit Year Ending 1/6/79	232	5,872,253	9,064,309	$8,948,015	$3,247,867	$5,700,148	34,335	$1.52	$.99
Tucson Transit Year Ending 1/6/79	131	4,682,041	7,841,870	5,197,065	N/A	N/A	29,704	1.11	.66
Prescott-Whipple Six months to 6/79	4	18,000	22,290	17,460	11,145	6,315	130	.97	.78
Soto-Nogales Six months to 6/79	4	N/A	71,668	N/A	35,834	N/A	551	N/A	N/A
Douglas Bus Company 1978 data[a]	2	N/A	N/A	N/A	N/A	N/A	60	N/A	N/A
Sun City - Del Webb Six months to 6/79	4	35,880	9,723	65,000	3,050	61,950	67	1.81	6.69
Glendale Dial-a-ride FY 1978-1797	6	156,000	115,000	239,436	40,347	199,098	442	1.54	2.08
Mesa Dial-a-ride Year ending 12/79	8	N/A	147,706	421,465	68,270	353,195	404	N/A	2.85
Paradise Valley Dial-a-ride July-September, 1979		N/A	10,842	30,575	3,601	26,974	172	N/A	N/A
Phoenix 16 (b) (2) Urban Six months to 12/78[b]	17	190,971	68,420	45,078	N/A	N/A	526	.24	.66
Tucson 16 (b) (2) Urban Six months to 12/78[c]	5	50,366	16,195	3,179	N/A	N/A	125	.06	.20
Arizona 16 (b) (2) Rural Six months to 12/78[d]	7	60,192	17,921	25,971	N/A	N/A	153	.43	1.45

[a]Data as presented in Arizona Department of Transportation, *Transit Issues in Arizona*, October, 1978, p. 3.
[b]Costs reflect only maintenance; driver and administrative cost not reported.
[c]Costs reflect gas and oil only; vehicles owned and operated by Jewish Community Center only.
[d]In most cases, cost does not include administration and driver cost.
Source: Information compiled by Mr. Bob Thake, Arizona Department of Transportation, January 4, 1980.

Publicly Owned Demand-Responsive Systems

These systems are usually referred to as "dial-a-ride" and typically have no fixed route. This concept began in the late 1960s as an experiment in Mansfield, Ohio, and Haddonfield, New Jersey. In 1974, the federal government sponsored dial-a-ride in twenty cities and has encouraged it when population density is too light to support a scheduled system. These systems often connect with scheduled metropolitan transit systems and can be an extension of a scheduled system. Three such systems operate in Maricopa County: in Mesa, Glendale, and Paradise Valley. Operating and financial data on these systems are included in Table 3.

Mesa uses taxicabs and operated at a $353,195 deficit in 1979, carrying 147,706 passengers (an average of 404 a day), using eight cabs. Glendale uses six vans and carried 115,000 passengers in 1979 (an average of 442 per day) at a deficit of $199,089. The Paradise Valley Dial-a-ride, using taxicabs, is relatively new and in the period October through December, 1979, carried 9,619 passengers (averaging 153 a day) at a deficit of $24,049 for the three months. All three of these systems are subsidized by city funds as well as Section 5 Urban Mass Transportation Administration (UMTA).

Specialized Transit

Specialized transit is a transportation service providing access to basic life-sustaining facilities for individuals who cannot travel to such facilities themselves. They are often specially equipped vans moving the elderly, the handicapped, or the disadvantaged. In 1978 365 specialized transit vehicles purchased with federal funds were in operation in Arizona by various agencies.[7] Approximately 200 of these were in the Phoenix and Tucson areas and agencies owned from one to fifteen such vehicles. ADOT administers the Urban Mass Transportation 16 (2) program and has provided eighty-three specialized vehicles costing approximately $1 million in federal and local funds on an 80/20 matching ratio.

Table 3 includes in its last three lines some operating and financial data on a small portion of this fleet.

Taxicabs

Thirty cities in Arizona have taxicab service. Yellow Cab and Checker Cab in Phoenix are the largest companies and average about 60,000 trips per month each with a combined fleet of 220 cabs. Both firms operate wheelchair vans.

Bicycles

For short trips (generally under five miles) the bicycle provides an alternative means of urban transportation. In 1973 the Arizona Highway Department (predecessor to ADOT) published a plan to develop 3,300 miles of bikeways by 1995. Federal funds through the Federal Highway Administration are available for bikeways. However, Arizona's need for highways has not permitted significant diversion of highway funds for separate bikeways so progress has been slow. Recently $33,200 in federal funds have been designated for construction of bikepaths in Sierra Vista, Safford, and South Tucson.

EVALUATION CRITERIA

Once the dimensions and characteristics of the passenger transportation system are noted, the next step is evaluation. Quantifiable evaluation is not possible — yet certain criteria can be established: availability of service, frequency of service, reliability of service, coordination of alternatives, marketing/public information, adequacy of equipment, and terminal facilities.

Availability of Service

From the passenger point of view, the ideal would be for each passenger to have a vehicle. However, given concern with the environment, congestion, pollution, and economics, this passenger ideal is far from the social ideal. Perhaps from the view of society as a whole, the ideal might be the opposite: every passenger moving in a multiple occupancy vehicle with as little expense, congestion, pollution, and fuel consumption as possible.

Since neither ideal can be achieved, the problem is to find a compromise that serves both ideals as much as possible: to trade off absolute availability (a vehicle for every driver) for availability to the most number of people at the least possible social cost. Where should public transportation be routed? What towns should have intercity bus service? What areas of the cities should have transit bus service? Which groups in the population need specialized transit? In short, what level of availability of passenger transportation is desirable?

Frequency of Service

Once availability goals have been established, frequency becomes a problem. Intercity bus service between various cities and towns is one matter; the frequency of such service is another matter. Frequency is also important in transit bus service. Depending on how much of the cost is to be covered by the farebox or by ticket revenues, frequency may be a function of demand for the service. Yet it is also true that demand for the service may itself be a function of availability and frequency. To some degree the problem is self-defeating. Demand is too small to generate the desired level of revenues from passengers so availability and frequency are small. But demand is too small because the service is not available and is not frequent enough to compete effectively with the private automobile.

Reliability

Along with availability and frequency comes the matter of reliability. People rapidly lose interest and turn to alternative means, if the bus is continuously late or does not arrive at all.

Coordination of Alternatives

The problem of coordination between alternatives is one of the most difficult operational problems for administrators. Two types of coordination are involved: system coordination and intermodal coordination.

System coordination refers to coordinating schedules so that buses arrive in close proximity to one another at transfer points. By careful coordination, a system can serve much more effectively if transfers can be expedited. To get any sort of coverage at all, transfers are a necessary evil; but they are a problem that is solvable with careful planning. So too with intercity bus operations. System schedules must be carefully coordinated to make the intercity bus an alternative to the private automobile.

Intermodal coordination is more difficult to achieve. System coordination is an internal operational matter but intermodal coordination involves several operations. In Arizona, very little intermodal coordination appears to exist. Dial-a-ride systems need to be carefully coordi-

nated with transit bus operations. AMTRAK schedules need to be carefully coordinated with transit bus operations and vice versa; airline schedules need to be coordinated with transit schedules and intercity bus schedules, etc. Waiting time should be minimized whenever possible.

Marketing and Public Information

Once the problems of availability, frequency, reliability, and coordination are solved, potential users must be informed of available alternatives. A recent survey revealed that 95 percent of the nonriding transit public knew "nothing at all" or "only very little" about bus routes, schedules or fares in metropolitan Phoenix.[8]

Phoenix Transit entered an aggressive campaign to inform the public of its services and in 1978 was allocated funds for a marketing program. An advertising firm and a marketing research firm have been retained in an effort to improve the marketing and public information about the Phoenix Transit system.

The problem appears in various degrees with most passenger transportation. A recent news article[9] indicated that a fairly broad-based survey found 50 percent of the respondents indicating they would be interested in rail passenger service between Phoenix and Tucson if it were made available to them. This is a particularly interesting finding in view of the fact that rail service already exists between these two cities via AMTRAK.

Adequate Equipment

The problem of equipment is another criteria for evaluation. The public is not going to be attracted to transit buses or intercity buses unless equipment is modern, clean, attractive, and comfortable. While buses probably can never duplicate the attractiveness and comfort of the private automobile, the equipment available must be reasonably adequate in order to present an alternative to the passenger car.

Terminal Facilities

The matter of terminals is the final criteria for evaluation. Adequate, clean, safe, and attractive terminals at convenient locations are necessary for both urban transit and intercity bus operations. Both Phoenix and Tucson have new downtown urban bus terminals, and the major intercity bus companies — Greyhound and Trailways — have relatively modern terminals.

Location is another matter, and again, cost is the controlling factor. In urban transit systems, the concept of terminals extends beyond merely a downtown location for bus departures and interchange; passenger waiting areas, such as bus stop seats and shelters, park-and-ride lots, kiss-and-ride lots, are also involved. In Phoenix and Tucson these problems are slowly being alleviated and some federal grant moneys have gone into bus shelters and other facilities.

DEGREE OF PUBLIC COMMITMENT

Many policy problems are related to passenger transportation, but most of them depend on how much money is available. Therefore, some understanding of the various federal grant programs and the past action of cities to avail themselves of federal funds is necessary in order to plan intelligently for the future.

Federal Programs

In an attempt to save a rapidly declining urban transit system, Congress passed a series of acts establishing matching grant programs. These began in a small way with the Housing Act of 1961 followed by the Urban Mass Transportation Act of 1964, the first major grant program. In 1973, Congress allowed diversion of highway trust funds for transit, and new major acts to assist mass transit in the United States were passed in 1974 and 1978.

Essentially these programs fund proposals by cities for the following types of projects:

- Capital improvement projects on an 80 percent federal and 20 percent local basis.
- Operating deficits grants on a 50 percent federal and 50 percent local basis.
- Miscellaneous programs for specialized transit for elderly and handicapped, grants to small towns and rural communities through the governor's office, intermodal terminal grants, and Sec. 22 intercity bus grants for smaller towns.

Tucson. Specifically, in Tucson the Model Cities Grants plus Urban Mass Transportation Administration grants allowed for improvements in the Tucson Transit operation and an extended period of free transit for the low-income and elderly on both Tucson Transit and Old Pueblo Transit (which ended in 1976). Other grants in the 1970s allowed considerable improvements to be made in transit services in the metropolitan Tucson area. Table 4 notes these UMTA grants over the years.

In 1979-1980, the City of Tucson utilized $4.5 million to finance the operating deficit of SunTran and to provide the local share of a federal grant for seventeen

new buses. The city also spent $1 million to provide demand-responsive transit service to handicapped persons the same year. The 1980-1981 budget calls for $6.8 million for SunTran and $1.3 million for handicapped service. Federal operating subsidies currently cover 25 percent of the operating budget of SunTran. Based on this ratio of federal money for operating support, the ten-year projection for SunTran involves $129 million of federal money.

TABLE 4

FEDERAL GRANTS TO TUCSON FOR URBAN TRANSIT

Capital Grants

Fiscal Year	*UMTA Grant*	*Local Share*	*Total*
1974-1975	$2,914,731	$1,085,539	$4,000,270
1975-1976	5,213,660	1,303,415	6,517,075
1976-1977	280,436	70,109	350,545
1977-1978	188,064	47,016	235,080
1978-1979**	238,846	59,712	298,558

Operating Assistance Grants

1974-1975-1976	$1,646,051
1976-1977	1,337,417
1977-1978	1,624,613
1978-1979	1,901,080
1979-1980*	1,901,080

*Submitted October, 1979
**Approval pending

Source: Data furnished by P.S. Cornelio, Tucson Transit Department, January, 1980.

Phoenix. In the case of metropolitan Phoenix, federal funds come through the Maricopa Association of Governments (MAG), in accordance with the 1974 act. Both capital grants and operating deficit grants are involved. Table 5 notes capital expenditures by Phoenix Transit and Glendale Dial-a-ride from 1971 to 1978 which total in excess of $17 million — $13 million of which came from federal grants. In 1979, capital projects totaled $999,000; projected capital improvement budgets for fiscal year 1980-1983 total $25.3 million with a federal share of $20.3 million.

Operating support money for the Phoenix Transit System, 1971-1979, is noted in Table 5. Starting with a City of Phoenix grant of $38,000 in 1971, total support to cover operating deficits has grown to an estimated $7 million in 1979. The federal share, based on the 50/50 formula in the 1974 act, is now $3.5 million a year. Both Scottsdale and Tempe make small contributions to the operating deficit in Phoenix Transit since they are served by some Phoenix Transit routes. Hence the City of Phoenix share of the deficit is less than 50 percent.

By 1985 the estimated operating deficit will exceed $20 million a year. The degree of federal funding of operating deficit after 1982 will depend on what action Congress takes when the 1978 act runs out.

TABLE 5

FEDERAL GRANTS TO PHOENIX FOR URBAN TRANSIT

Capital Grants

Month/Year	*UMTA Grant*	*Local Share*	*Total*
Dec., 1972	$1,902,666	$ 960,344	$2,863,010
Nov., 1974	4,323,896	1,080,974	5,404,870
May, 1977	2,638,808	659,702	3,298,510
June, 1977	3,722,724	930,681	4,653,405
June, 1977	820,828	205,207	1,026,035
Feb., 1978	273,280	68,320	341,600
Total	$13,682,202	$3,905,228	$17,587,430

Operating Assistance Grants

Fiscal Year	*Phoenix Support*	*Other Cities' Support*	*Federal Support*	*Total*
1971	$ 38,000	—	—	$ 38,000
1972	181,471	—	—	181,471
1973	410,548	—	—	410,548
1974	741,652	—	—	741,652
1975	834,658	—	$ 250,000	1,084,658
1976	1,110,534	$291,339	1,401,873	2,803,746
1977	1,445,708	208,100	1,651,808	3,303,616
1978	2,059,480	150,106	2,209,586	4,419,175
1979*	3,351,300	160,500	3,511,800	7,023,600

*Estimated

Source: Maricopa Association of Governments, *Five-Year Transit Plan, FY 1979-1983*, p. 1-10.

Miscellaneous Grant Programs

The Section 16(b)(2) program was originally established in the 1970 amendments to the basic 1964 act and involves capital grants for transportation of the elderly and handicapped on an 80/20 basis. As noted previously, 365 specialized vehicles costing over $100 million have previously been used in this program. Under the funding in the 1978 act, the Urban Mass Transit Administration has set aside $171,000 for 1979-1980 for added projects in this category.

Section 18 is an innovation under the 1978 act specifically aimed at smaller towns and rural passenger transportation. In 1979, $75 million was available for this program; Congress allocated over $100 million per year for 1980-1982 for this program. Grants are made to and administered by the states on a formula based on the relative portion of the state's rural and small city population as compared to national rural and and small city population. Arizona was allocated $546,975 for 1979 under Section 18 to be allocated by the Governor's office.

Section 21 concerns capital grants for intercity and intermodal terminals; $40 million per year through 1982 has been appropriated for this program nationally. This portion of the act contemplates *intermodal* terminals (facilities utilized jointly by both intercity and urban transit buses) and provides for 80 percent federal financing for lease or construction of such facilities. No grants have been made in Arizona. Quite obviously, these federal grants programs have been, and will continue to be, important to both Phoenix and Tucson as well as to other Arizona cities.

Policy Problems

Federal grants are currently available only when matched by local funds — 20 percent for capital acquisition (80 percent federal), and 50 percent for operating deficits (50 percent federal) in urban transit and for intercity bus operating agreements and bus terminal upgrading. State highway money to match federal money (generally on a 75 percent federal and 25 percent state basis) is necessary to build bike paths.

The projected needs for both Phoenix Transit and SunTran and the funds necessary to meet these goals in future years have been noted. Whether such local and state commitment of funds will be available in future years cannot be predicted. Likewise, it is difficult to predict how Congress will react when the five-year 1978 act runs out and the $13.7 billion in public transportation aid is exhausted in 1983. However, it is possible that a continuing and probably increasing public commitment will be necessary to sustain both urban transit and intercity bus transportation in the future.

To achieve this, realistic goal-setting is necessary. Funds should be used where they can produce the greatest results. Trip purpose surveys have repeatedly shown that approximately one-third of all trips in the urban environment are work related, about one-third are for personal business and about one-third are pleasure related. It is probably unrealistic to expect public transportation to substitute for the personal car in most business and pleasure-related trips since the car is more convenient. But as energy costs increase and as good public transportation develops, some substitution in these areas can be expected. However, on work-related trips, real hope exists that public transportation can make a significant contribution. Policy decisions aimed at making public transportation more attractive to the journey-to-work driver would seem to be most productive.

Increasing Efficiency

The key to more efficient use of existing systems is the load factor. In Maricopa County a recent survey indicates that an automobile carries an average of 1.29 persons per trip. If this load factor could be increased even slightly, the existing road and street system could be used more efficiently.

Policies encouraging car pooling and van pooling could make better use of the present system. Financial incentives could be instituted that would accelerate policies to encourage car and van pooling: lower taxes and fees for vehicles used in pools; tax credits to firms providing preferred parking for such vehicles.

CONCLUSION

Passenger transportation is an important part of the Arizona economy and it is an area where decisions and choices have to be made. Understanding the dimensions and characteristics of the passenger transportation system provides a base for that decision making. Evaluation of the performance of the system and consideration of the past levels of support are also important in decision-making about passenger transportation. Many trade-offs are possible and many potential policy modifications may be desirable in the attempt to have the passenger transportation system serve the maximum number of people at the lowest possible cost and with the least possible environmental disruption.

---

[1]Definitions: *passenger mile* — one passenger carried one mile; *seat mile* — one bus seat (empty or full) carried one mile; *daily vehicle mile* — total miles traveled by one vehicle per day.

[2]According to correspondence from Arizona Department of Transportation (ADOT).

[3]Ibid.

[4]Ibid.

[5]Ibid.

[6]Information provided by Director of Operations, Sun Valley Bus Lines.

[7]According to a survey by ADOT.

[8]Survey conducted by the City of Phoenix, 1978.

[9]*Phoenix Gazette*, January 10, 1980.

Arizona's Railroad System

T.F. GRIFFITH

The development of modern transportation, as a system, in Arizona began slightly over 100 years ago with the arrival of the Southern Pacific railroad in Yuma in 1877. Since that time the railroad industry's contribution to the state has been so great as to be almost immeasurable. Today, Arizona's railroads provide vital rail service to Arizona agriculture, mining, and timber industries and also serve as interstate rail bridges linking California with points east.

ARIZONA'S RAIL SYSTEM

It has been estimated that as many as 88 railroads have played a part in Arizona's history.[1] There have been 35 separate and distinct railroads developed under different ownerships, 18 industrial railroads, 20 railroads built as corporate subsidiaries by larger roads, and five street railroads. Today, only eight remain. Two are major interstate common carriers, four are intrastate lines, and two are privately owned industrial railroads which are operated to meet the specific needs of their owner, the Salt River Project. Arizona's railroads operate on slightly more than 2,000 miles of line within the state and serve over 1,000 firms ranging in size from large mining interests to small agricultural feed processors.[2]

Arizona's rail system consists of two Class I railroads (railroads having annual operating revenues of over $50,000,000) — the Atchison, Topeka, and Santa Fe Railway Company and the Southern Pacific Transportation Company. These two lines account for 1,829 of Arizona's approximately 2,024 miles of track, exclusive of sidings and yard track. There are four Class III railroads in Arizona (railroads having annual operating revenues less than $10,000,000) — the Apache Railway Company; the Magma Arizona Railroad Company; the San Manuel Arizona Railroad Company; and the Tucson, Cornelia and Gila Bend Railroad Company. The two industrial railroads owned and operated by the Salt River Project are the Black Mesa and Lake Powell Railroad and the Coronado Generating Spur.

The Arizona segment of the Southern Pacific Railroad provides interstate service through the southern part of the state; the Santa Fe Railroad serves a similar function in the north. Both maintain and operate numerous branch lines within Arizona that are critical to local industry and economies. The Arizona Corporation Commission has catalogued 1,074 industries (Table 1) which depend upon rail transportation to move their materials.

Although other modes of transportation have overshadowed the railroads, they remain an important component of Arizona's transportation dimension. This article views the overall rail system and discusses both rail freight and rail passenger transportation as well as current issues in Arizona rail transportation.

T.F. Griffith is Associate Professor of Transportation in the Department of Marketing, College of Business Administration, Arizona State University.

Table 1 also indicates that the Southern Pacific Railroad owns 50 percent of Arizona's common carrier rail track, which accounts for 68 percent of the carloads shipped from and received by Arizona interests. The Santa Fe Railroad owns 42 percent of the common carrier rail track and accounts for 24 percent of the carloadings. The intrastate carriers own 8 percent of the common carrier rail track and account for 8 percent of the carloadings. Southern Pacific's dominance is principally the result of traffic generated by the large mining concerns it serves. In fact, as Table 2 indicates, the Southern Pacific Railroad carries considerably more metallic ore than any other single commodity.

TABLE 1

ACTIVE RAIL USERS AND CARLOADS SHIPPED AND RECEIVED

Railroads	*Number of Active Rail Users*	*Miles of Track*	*Carloads Shipped and Received*
Sante Fe Railroad			
Main line	362	698	96,795
Branch line	8	130	2,242
Total	370	828	99,037
Southern Pacific Railroad			
Main line	548	596	89,743
Branch line	140	425	189,951
Total	688	1,021	279,694
Other common carrier railroads	16	175	34,885
Total	1,074	2,024	413,616

Source: Arizona State Rail Plan - 1979 Update, Arizona Department of Transportation, July, 1979

The Atchison, Topeka, and Santa Fe

The Atchison, Topeka and Santa Fe Railway[2] is a major subsidiary of Santa Fe Transportation Industries, Inc., an integrated, multimodal transportation holding company with corporate headquarters in Chicago, Illinois. Originally the Santa Fe reached Arizona using Southern Pacific tracks which it joined at Deming, New Mexico, and transited through to Benson, Arizona. At Benson it joined a subsidiary, the New Mexico and Arizona Railroad, which had been built southwesterly to Fairbanks and Nogales to meet an affiliated line building up from the seaport of Guaymas, Mexico. The last connection was made at Nogales in October, 1882. Actually this was a long and circuitous route to reach California.[3]

A more direct route became available to the Santa Fe through their investment in the St. Louis and San Francisco Railway, which had acquired the bankrupt Atlantic and Pacific Railroad and its charter and land grants to build from St. Louis into California along the

TABLE 2

CARLOADS SHIPPED AND RECEIVED BY COMMODITY

Product	*Santa Fe Railroad*		*Southern Pacific Railroad*		*Other Common Carrier Railroads*		*Total*	
	Shipped	*Received*	*Shipped*	*Received*	*Shipped*	*Received*	*Shipped*	*Received*
Farm products	1,280	5,792	5,018	4,894	0	124	6,298	10,810
Metallic ores	3,294	5	85,788	80,775	40	2,971	89,122	83,749
Nonmetallic ores	607	350	2,794	2,400	669	84	4,070	2,834
Food and kindred	2,789	5,964	1,845	11,045	0	3	4,634	17,012
Lumber and wood	4,807	15,416	402	7,912	1,555	439	6,744	23,767
Chemicals and allied	129	1,130	3,058	8,049	4,238	486	7,425	9,665
Petroleum	1,024	6,797	34	7,185	85	503	1,143	14,485
Primary metal products	239	704	10,865	3,610	3,562	760	14,666	5,074
Waste and scrap	452	3,368	2,277	6,984	35	2,676	2,764	13,028
Coal	0	1,200	0	4,110	0	3,530	0	8,840
Pulp, paper and allied	14,460	2,955	1,116	4,162	4,799	7,675	20,375	14,792
Stone, clay and glass	4,530	7,113	0	5,395	10	318	4,540	12,826
All other	1,693	12,935	1,697	18,281	111	332	3,501	31,548
Total	35,304	63,729	114,894	164,800	15,084	19,901	165,282	248,430

Source: Arizona State Rail Plan - 1979 Update, Arizona Department of Transportation, July, 1979

thirty-fifth parallel. The project failed a few hundred miles out of St. Louis. However, with Santa Fe's investment and existing operations in New Mexico, work was begun near Albuquerque in 1880 and completed across Arizona to Needles in 1883. At Needles the railroad connected with a branch of the Southern Pacific for the remainder of the route across California.

Today, Santa Fe rail operations extend from Chicago through the midwestern and southwestern states to California. The company owns a total of 12,957 miles of main line track with 828 miles of track located in Arizona. The Santa Fe currently serves 370 Arizona rail users shipping farm products, coal, timber, paper, and other wood products.

The Southern Pacific Transportation Company

The Southern Pacific Transportation Company is a subsidiary of the Southern Pacific Company, an integrated multimodal holding company, which has its corporation headquarters in San Francisco, California.

The Southern Pacific railroad initially entered Arizona as an attempt by the owners of the Central Pacific Railroad to preempt competition from the east by blocking, with their own lines, all of the known transcontinental entrances to their territory[5]. During the late 1860s the owners of the Central Pacific had control of 85 percent of California railroads; however, this monopoly was being threatened by the federal government, which was making generous grants to rival western roads in order to stimulate competition. Charters were issued to the Texas Pacific along the thirty-second parallel, the Atlantic Pacific along the thirty-fifth parallel and the Southern Pacific. The owners of the Central Pacific acquired the California charter of the southern Pacific in 1868 and began building large operations in the vicinity of Los Angeles. This work was later extended through the San Joaquin Valley toward Yuma. The first scheduled operations of Southern Pacific's Arizona Division began in January, 1879, with a daily round trip operating from Yuma to Gila City and Adonde, a total distance of 30 miles. The line reached Tucson on March 17, 1880, and was completed across Arizona to El Paso in 1881.

Southern Pacific rail operations now extend over twelve states from Oregon through the Southwest to East St. Louis. The company operates on more than 12,000 miles of track with approximately 1,021 miles of main and branch line track in the southern half of Arizona. Southern Pacific serves almost 700 Arizona customers and moves mineral and agricultural products.

Apache Railway

The Apache Railway Company, a wholly owned subsidiary of Southwest Forest Industries, is headquartered near Snowflake, Arizona and operates over 74 miles of track between McNary and Holbrook. The railroad has five users; however, 90 percent of the traffic moved is generated by Southwest Forest Industries. The principal products moved are lumber, wood and paper products, petroleum products, coal, grain, and chemicals.

Magma Arizona Railroad

The Magma Railroad operates over 28 miles of track between Magma and Superior and is a wholly owned subsidiary of the Magma Copper Company. The railroad, which began operations in 1915, serves three users; however, most of the freight moved on the line consists of primary metal products and metallic ores which originate near Superior and are transported to San Manuel for smelting.

San Manuel Arizona Railroad

The San Manuel Railroad, which extends from Hayden to San Manuel, is also a wholly owned subsidiary of the Magma Copper Company. The railroad began operations in 1953 and operates over 29.4 miles of main line serving only the San Manuel Copper Company. The freight consists of chemical products, metallic ores, primary metal products, nonmetallic minerals and lumber products.

Tucson, Cornelia, and Gila Bend Railroad

The Tucson, Cornelia and Gila Bend Railroad is a wholly owned subsidiary of the Phelps Dodge Corporation and operates over 44.34 miles of track between Gila Bend and Ajo. The railroad has three users, and the products consist of petroleum products, primary metal products and metallic ores.

Black Mesa and Lake Powell Railroad

This railroad is owned and operated by the Salt River Project and runs from a strip mine near Kayenta at Black Mesa to the Navajo Generating station near Page. The line does not connect to any common carrier railroad, and its cargo consists only of coal to fire the generating plant's steam boilers.

Coronado Generating Spur

This railroad is also privately owned by the Salt River Project and is used exclusively to haul coal from its connection with the Santa Fe, at Holbrook, to the Coronado power generating station located near St. Johns. The line is 43 miles long and presently serves three unit-trains per day consisting of 80 to 100 cars. It is planned to extend the existing line to Springerville where it will serve Tucson Electric's plants.

RAIL FREIGHT TRANSPORTATION

Railroads are generally recognized as specialized line-haul carriers of bulk products between major industrial sidings and terminal yards.[6] This description fits freight operations in Arizona quite well. To a large extent, Arizona serves as a bridge for interstate traffic which neither originates nor terminates in the state. It is estimated that as much as 74 percent of rail traffic in Arizona is in fact bridge traffic.[7] The remaining 24 percent of rail traffic, approximately 10 million revenue tons, reflects the needs of the industries and populations served by the individual railroads.

The Southern Pacific, the state's largest railroad, is also the state's largest originator of revenue tons. Approximately 37 percent of the tonnage it carries in Arizona is originated in Arizona. In contrast, only 10 percent of the total revenue tonnage carried by Santa Fe in Arizona is originated in the state. This occurs because the Southern Pacific's route through Arizona is through the southern part of the state which has an extensive copper industry. More than 85 percent of the Southern Pacific's Arizona-origin tonnage is associated with the copper mining industry, and most of its branch lines also serve copper mining activities. Farm products account for approximately 9 percent of the Southern Pacific's originations which are generated in Yuma, Maricopa, and Pima Counties, and consist principally of citrus, feed grains and cotton.

Approximately 49 percent of the revenue tonnage carried in Arizona by the Southern Pacific terminates in Arizona. Seventy percent of the terminating tonnage is comprised of freight associated with the copper industry and farming. Approximately 58 percent of the terminating tonnage is metallic ore, the bulk of which terminates at Ajo, Douglas, San Manuel, Clifton and Globe. The remaining terminating freight is related to population centers and consists of inbound food and consumer products which terminate at Tucson and Phoenix, and coal products for consumer use and energy generation.

The Santa Fe, which serves the northern part of Arizona, does not have a comparably large industrial base to support a high level of cargo originations and terminations. As mentioned previously, only 10 percent of the Santa Fe's Arizona tonnage originates within the state. Lumber and wood constitute approximately 24 percent of the originations followed by pulp and paper, and farm products at 13 percent each.

The Santa Fe's Arizona terminations are also substantially less than the Southern Pacific's with only 17 percent of its Arizona operations terminating within the state. The principal commodities terminated are petroleum and coal (25 percent of the terminations), lumber and wood (22 percent of the terminations), and stone and clay (10 percent of terminations).

RAIL PASSENGER TRANSPORTATION

With the expansion of highway and air transport systems, rail passenger service has become less important. By 1970, the railroad share of the United States intercity passenger service was only 7.2 percent of all for-hire intercity passenger transportation. Rail passenger volume of all intercity travel, including automobile trips, was less than 1 percent of the total 1970 United States intercity passenger movements.

There are numerous reasons for the low demand for rail passenger transport, mainly the faster speed of air transportation and the greater flexibility of the automobile. Because of the continued low demand for rail passenger service, management was reluctant to commit capital investment to passenger operations, resulting in the deterioration of passenger service The Interstate Commerce Commission reacted to this situation by permitting railroads to discontinue passenger service. During the period between 1958 and 1970, nearly one-third of the intercity passenger train service was discontinued. While this action alleviated the problem of deficits in passenger operations, it did not stop all deficits; between 1963 and 1970 deficits exceeded $400 million annually.

In response to continuing deficits and particularly the 1970 bankruptcy of the Penn Central Railroad, Congress enacted the Rail Passenger Service Act of 1970, which created AMTRAK, the National Railroad Passenger Corporation.

Carriers previously engaged in passenger service were given the option of becoming associated with AMTRAK or continuing independently. Carriers that chose not to become associated with AMTRAK were not permitted to discontinue their services for a period of at least five

years. Three railroads — the Denver & Rio Grande Western, Rock Island, and Southern Railway — did not become affiliated with AMTRAK.

AMTRAK currently serves Arizona utilizing the northern Santa Fe route (Southwest Limited) and the southern, Southern Pacific route (Sunset Limited). The Southwest Limited provides daily service each way from Los Angeles to Chicago, and the Sunset Limited provides service in each direction three times weekly between Los Angeles and New Orleans. Intercity rail passenger service in Arizona is available between Phoenix and Tucson although it consists only of one morning eastbound train on Mondays, Wednesdays, and Saturdays, and one evening westbound train on Tuesdays, Thursdays and Saturdays. However, as a result of the AMTRAK Reorganization Act of 1979, AMTRAK is enabled to operate jointly funded additional service in conjunction with, and under the sponsorship of, state, regional, or local agencies. The act stipulates that the sponsor must pay 20 percent of the solely related costs of the service in the first year of operation, 35 percent of such costs in the second year of operation, and 50 percent of such costs in each year of operation thereafter. Due to the availability of federal funds, combined with increasing interest in rail passenger service within the state, the Arizona Department of Transportation (ADOT) made a commitment in their 1979 Overall Work Plan to study the feasibility of establishing state assisted rail passenger service between Phoenix and Tucson.

ADOT's Phoenix/Tucson rail passenger study, published in March, 1980, listed the following findings:[8]

- The Southern Pacific track linking Phoenix and Tucson is in excellent condition permitting passenger train speeds of approximately 70 mph.
- A reasonable estimate of the number of passengers that could be attracted by the proposed service is 240 a day.
- The most reasonable estimate of subsidy required to sustain the service for a year is $2,409,000.
- The amount of subsidy to be borne by the sponsor under the most reasonable estimate would be: $482,000 the first year; $843,000 in the second; and $1,204,500 in the third year.
- Existing highway facilities have and will continue to have sufficient capacity to accommodate traffic traveling between Phoenix and Tucson.
- Buses and airlines traveling between Phoenix and Tucson currently have the capacity to carry significant numbers of additional passengers.
- In terms of energy efficiency, rail passenger service does not appear to offer any advantage over bus.

Also, in 1980, ADOT studied the feasibility of establishing permanent commuter rail service in the Phoenix-Mesa corridor.[9] The study was the result of emergency commuter rail service between Phoenix and Mesa during the mid-February, 1980, bridge closings. The study found that express bus service appears to be more desirable in the Phoenix-Mesa corridor than rail service. However, ADOT recommended that consideration of rail as a means of public transportation should not be discarded and advised against actions which might preclude the option for implementing rail service in the future.

Whether intercity rail transportation of passengers will ever become a viable operation, remains to be seen. Arizona railroads have consistently maintained that passenger trains are not economically feasible and have never constituted a signifigant portion of revenues. Indeed, in 1979 AMTRAK had a record year in revenues earned and ridership but could only attain a revenue-to-expense ratio of 41.5 percent.[10] It must be pointed out, however, that when fully utilized, rail operations tend to be relatively more energy efficient than air or automobile alternatives. Given the prevailing energy problems, rail passenger service may well become a valuable resource.

CURRENT ISSUES IN ARIZONA RAIL TRANSPORTATION

While many issues are involved in the continued operation and viability of the nation's railroads, current efforts to reform regulation of the railroad industry are of interest to Arizona. These efforts, even though in early stages of development, are already changing Arizona shipping patterns.

Recent action in the area of regulatory reform has been dramatic. Commercial air transportation regulation was significantly reduced through the Airline Deregulation Act of 1978. Regulation of interstate motor carrier operations has also been significantly reduced through the recent enactment of the Motor Carrier Act of 1980. Regulatory reform of the railroad industry has been provided for by the recent passage of the Rail Act of 1980.

Regulatory reform of the railroad industry has been directed primarily toward shoring up the railroad industry, in which many carriers are having severe financial problems, by allowing them to become competitive with the other modes of transportation. This is in contrast with the reform of airline and motor carrier regulation which was directed toward promoting greater competition within each mode. The legislation gives

railroads considerable freedom to raise freight rates free of Interstate Commerce Commission control, to sign rate-and-service contracts with shippers, to raise rates unilaterally on one railroad's portion of joint-line shipments and to abandon unwanted branch lines more freely.

The legislation is so recent that there is little information available on which to judge the ultimate impact on the rail industry. It is clear, however, that the railroads still will not have as much freedom from regulation as is enjoyed by their principal competitors, the motor and water carriers. Evidence indicates, however, that the legislation will be beneficial.

During the period of congressional deliberation of railroad regulatory reform, the Interstate Commerce Commission proceeded administratively on the same course. Particularly important to Arizona shippers is the commission's action on May 28, 1979, exempting a number of agricultural commodities from regulation.

As recently as 1950, railroads were dominant in the movement of fresh fruits and vegetables throughout the nation. However, the advent of the Interstate Highway System, the staggering rise in the number of independent truckers, low cost fuel, and the exemption of these commodities from motor carrier regulation all resulted in the decline of railroads as a major factor in the movement of perishables. Rail participation in the movement of perishables dropped to less than 10 percent of the market.[11] The commission's exemption of these commodities from regulation was an effort to stop the downward trend.

The result of the exemption of perishables has been dramatic. During the first year of exemption, the Southern Pacific experienced a 43 percent increase in perishable traffic.[12] During the first five months of 1980, their lettuce loadings increased 80 percent, and citrus loadings from Southern California and Arizona were twice that experienced during the same period of 1979. Arizona potato shipments tripled the previous year's volume for the growing season. To meet the demand for rail transportation of California and Arizona produce to Eastern and Midwestern markets, the Southern Pacific has added two special trains. The "Salad Bowl Express" which began operating as four cars in 1979 was expanded to three complete trains daily during the harvest peak. The "Golden West Express" was added to this service in May, 1980.

The impact of perishable traffic exemption has literally reached across the nation. For example, Conrail traffic in these commodities throughout the northeastern region of the United States was up 23 percent in carloadings and 33 percent in tons carried during the first year of exemption.[13] During the first five months of 1980, carloadings and tons carried were up 67 percent and 79 percent respectively over the same period of 1979.

Proponents of regulatory reform for the rail industry use results such as these to indicate the value of allowing price and service to be dictated by the marketplace, customers, and competition, rather than an independent commission.

CONCLUSION

Railroads began the transportation revolution in Arizona forming the state's first modern transportation system. Today, other modes of transportation have forced railroads from their once preeminent position; however, they remain as an important and necessary component of Arizona's transportation dimension. Their inherent advantage as a highly integrated transportation system for hauling carloads of goods in trains over long distances is particularly suitable to many of Arizona's products and their markets. This, coupled with their characteristic of being a relatively low energy-consuming carrier, enhances their value to the state's economy.

The rail mode is the most energy efficient form of transport for many goods, especially long-distance movement of bulk goods. The basic principle underlying railroads is application of the flanged steel wheel to the steel track resulting in relatively little frictional resistance. As a consequence, it requires less horsepower to move a net ton of cargo by rail (2.65 h.p.) than by pneumatic tire on a highway (7.00 h.p.) or a modern heavier-than-air craft (500 h.p.).[14] This inherent fuel efficiency of the railroad suggests that in the future, railroads will play an increasingly important role in the state's economy. As energy efficiency becomes increasingly important, both in terms of national policy and economics, the railroads should benefit.

Specifically, in the future, railroads should benefit from a trend toward expansion of their piggyback services in which the truck trailer or the truck container separated from its wheels is carried on flatcars. The practice started in the early nineteenth century with railroads hauling circus and farm wagons, but it did not expand rapidly until the mid-1950s. Today, virtually all railroads now offer some degree of piggyback service. The advantage of this form of transportation is that it combines the short-haul advantages of the motor carrier with the long-haul economies of the railroads.

The future of rail passenger service is less optimistic. Some forecasts of rail passenger traffic indicate service

could quadruple. However, much of the increase is anticipated in high density corridors. While some expansion of commuter service has been forecast, it is expected in areas that have a considerably higher density of users than Arizona.

The impact of deregulation on the railroad industry is not yet obvious since the legislation has not yet been implemented. However, the results of regulatory reform undertaken administratively by the Interstate Commerce Commission indicate that Arizona shippers and consumers may well benefit from reduced regulation.

A view to the future, therefore, presents an outlook that is fairly good. There is hope for a reversal of the long-term decline in both freight and passenger traffic and the possibility of a system that is more responsive to customer needs and competitive pressures.

---

[1]David F. Myrick, *Pioneer Arizona Railroads* (Golden, Colorado: Colorado Railroad Museum, 1968) p. 4.

[2]*Arizona State Rail Plan — 1979 Update*, Arizona Department of Transportation, p. 15.

[3]Much of the statistical information regarding the Atchison, Topeka and Santa Fe Railway Company and the other individual carriers discussed in this section was obtained from the *1978 Arizona State Rail Plan*, Arizona Department of Transportation.

[4]Myrick, p. 12.

[5]Matthew Josephson, *The Robber Barons* (New York: Harcourt Brace Jovanovich, 1934) p. 219.

[6]John L. Hazard, *Transportation: Management, Economics, Policy*, (Cambridge, Maryland: Cornell Maritime Press, 1977) pp. 127-140.

[7]*1978 Arizona State Rail Plan*, pp. VI-22 - VI-35.

[8]*Phoenix/Tucson Rail Passenger Study*, Arizona Department of Transportation, p. x.

[9]*Phoenix/Mesa Commuter Rail Study*, Arizona Department of Transportation.

[10]*Information Letter*, Association of American Railroads, 2275, July 18, 1978.

[11]"Hitting the Comeback Trail," *Railway Age*, April 28, 1980, p. 22.

[12]*Information Letter*, Association of American Railroads, 2298, June 25, 1980.

[13]Ibid., 2299, June 25, 1980.

[14]Hazard, p. 128.

Scheduled Air Passenger Transportation in Arizona

NORMAN E. DANIEL
DOUGLAS COCHRAN

The United States airline industry earned record profits in 1978 — $1.2 billion[1] — and may well experience record losses only two years later in 1980: During the first six months of this year, losses for the airline industry were $274 million.[2] The airline industry is in a period of transition that is both dramatic and traumatic. This evolution is primarily due to rapidly escalating fuel costs and economic deregulation. The consequences of the current recession have greatly complicated the inevitable problems in such a transition.

In reality, of course, the airline industry has been changing over a long period of time, but the developments of the past few years have greatly accelerated the pace of change and have had substantial impact on scheduled air service in Arizona. A brief look at the development of air service in Arizona is helpful in understanding the current developments.

The airline industry is currently experiencing dramatic fluctuations due primarily to escalating fuel costs and deregulation. This article discusses the emergence of local service carriers and commuter airlines and the effects of the Airline Deregulation Act of 1978.

Norman E. Daniel is a member of the transportation faculty in the Department of Marketing, College of Business Administration, Arizona State University. Douglas Cochran is a faculty member of the ASU Department of Management.

Early air service in Arizona was essentially a part of transcontinental routes traversing the state. A predecessor of Trans World Airlines (TWA) initiated service at Winslow, primarily as a fuel stop, and later offered service to the Grand Canyon via a stop at Valle. A forerunner of American Airlines also offered service to Douglas, Tucson, and Phoenix on a transcontinental route well before World War II.

The development of tourism and general economic growth led to the development of Phoenix and Tucson as profitable markets willingly served by airlines in the post-World War II period. This was true even at a time when such operations were unsubsidized. However, service to other Arizona cities must be explained largely in terms of federal air transportation policies, particularly as they involve subsidy practices.

EMERGENCE OF LOCAL SERVICE CARRIERS

The move to larger and more technologically advanced aircraft made it unnecessary for airlines (like American and TWA) to stop at points such as Douglas and Winslow for refueling. It also became generally impractical to serve airports at these cities and at Valle (Grand Canyon). It was the anticipation of developments such as these that led the Civil Aeronautics Board (CAB) in 1944 to establish, on an experimental basis, a new class of carrier — local service or "feeder" airlines. The CAB reasoned that existing trunk lines would concentrate on

long haul and heavy density routes where profits were more likely. The board then concluded that a category of carrier that only served the smaller cities would be more likely to provide superior service to these communities. Although the CAB chose to treat the program as an experiment and granted only temporary, renewable certificates to the local service carriers, Congress granted permanent certificates to such carriers in 1955.

The CAB imposed various restrictions on the local service airlines to minimize their competition with the trunk lines, and federal subsidies were made available to permit service between the smaller communities and to link these communities to the larger cities.[3]

Congress and the CAB generally have not relied heavily on internal subsidization in air transportation. Internal subsidization requires a carrier to use "excess" profits from successful routes or markets to subsidize unprofitable service to less popular points, a practice that has been common in rail and highway service. One major limitation of such a policy in air transportation was the absence of significant "excess" profits on virtually any routes during the developmental period. An illustration of exceptions to this general policy was the requirement that American Airlines continue to be responsible for service to Douglas for years after American ceased to receive direct subsidies.

Two local service airlines served Arizona in the years just following World War II — Bonanza Airlines, now part of Republic Airlines (formerly Hughes Airwest), and Frontier Airlines. No other local carriers, except Hughes Airwest, served Arizona until recent deregulation allowed freer entry into markets.

The same circumstances that induced the trunk lines to concentrate on long haul and heavy density routes also influenced the local service airlines. That situation along with the desire of Congress and the CAB to limit subsidies, began a process that altered the character of the local service airlines. The CAB began to require certain levels of traffic or special extenuating circumstances if a route were to continue receiving subsidy. Additionally, the CAB permitted reduction or elimination of service on routes to many communities that were unprofitable in order to reduce carrier losses (and ultimately subsidies). In other cases, the local service carriers were given added route authority which often made their services more competitive with trunk lines. The adoption of larger aircraft, especially jet aircraft, contributed greatly to this trend.

By the late 1970s these carriers could better be described as regional trunk lines rather than local service airlines. This trend resulted in the discontinuance of service by this class of carrier to such communities as Safford, Prescott, Kingman, Winslow, and Page. Although each of those towns was being subsidized by the CAB, the amount of the subsidy (almost a half-million dollars per year, per community), plus revenue generated at each community, was not sufficient to permit profitable operation, particularly of jet aircraft.

COMMUTER AIRLINES

Another type of carrier — the commuter airline — was evolving to fulfill the role of serving the smaller cities that were being substantially abandoned by the local service airlines. At present, commuter airlines are defined as scheduled airlines carrying passengers or mail and operating aircraft with a maximum capacity of less than fifty-six passengers. The new standard was set by Congress as part of the 1978 deregulation. Prior to that time the size of aircraft, which were exempt from federal economic regulation, was set by the CAB. The recent previous standard had been thirty-passenger aircraft, and the size was even smaller at an earlier date.

Prior to the passage of the Airline Deregulation Act of 1978, the Arizona Corporation Commission was responsible for the regulation of intrastate carriers. All such carriers (e.g., the now defunct Apache Airlines) were subject to regulation regardless of the size of aircraft operated. All carriers would have been exempt if operating in interstate service, however, because all aircraft operating in Arizona by these carriers were under the size exempted by the CAB (in contrast, for example, with PSA in California). The Corporation Commission issued certificates of convenience and necessity and regulated fares. The commission was normally constrained to authorizing a single carrier between market pairs by the state's "regulated monopoly" law. However, after the federal government passed the deregulation legislation in 1978, it was ultimately decided that this law preempted state activity in connection with such regulation. Accordingly, the commission ordered:

> that no carrier, in order to engage in transportation by air, need to seek or obtain a certificate of public convenience and necessity or contract carrier's permit or any other authority from the commission after the effective date of this order. (October 17, 1979)

The metamorphosis of the local service airlines made it evident that if smaller cities were to receive air service it would generally involve service by some other type of carrier. After considering the possibility of flow-through subsidies for commuter airlines, the CAB elected to provide direct subsidies to newly certified carriers such as Air New England and Air Midwest. Although Air

New England was classified as a local service airline for a brief period of time, these carriers were generally not treated as local service carriers — an important point in view of the method used for determining subsidy levels for local service carriers. In 1978 the CAB expanded the new subsidy program by agreeing to provide regional feeder-service certificates to Cochise Airlines and Sky West Aviation and to subsidize service by these carriers to certain points in Arizona and neighboring states.

The policy of the CAB in this decision in the Arizona service investigation was partly negated by subsequent deregulation. However, certain points reflected in the decision are worth reviewing. Twelve Arizona cities were involved in the investigation and the CAB separated these into three categories. Yuma, Grand Canyon, and Flagstaff (and El Centro, California) were viewed by the Board as being capable of supporting air service without subsidy; Cochise Airlines, although certified to serve them, was not to be eligible for subsidy on service to these points.

Kingman, Prescott, Page, and Winslow (and Blythe, California) previously had been served with large aircraft by Frontier Airlines or Hughes Airwest, but these airlines had suspended these operations because of financial losses. The CAB authorized Cochise Airlines to serve Kingman, Prescott, and Winslow (plus Blythe) on a subsidized basis for a limited experimental period, and Sky West Aviation to do the same for Page. Cochise Airlines was permitted to serve Page on an unsubsidized basis, and Sky West was authorized to serve, without subsidy, the points awarded to Cochise Airlines.

The CAB chose at that time not to add additional subsidized points to the certificated system, and Douglas/Bisbee, Ft. Huachuca/Sierra Vista, and Lake Havasu were therefore not included in the subsidized system. The board modified the certificates of Frontier Airlines and Hughes Airwest to make service on routes affected by the above decisions permissive and subsidy ineligible.

EFFECTS OF THE AIRLINE DEREGULATION ACT OF 1978

The environment for commercial air transportation was dramatically altered in October, 1978, when Congress passed the Airline Deregulation Act of 1978. The legislation followed a short period in which the CAB had itself been substantially altering its approach to regulation, but the new law itself both accelerated and expanded the changes.

The law has a number of major provisions that can be mentioned only briefly here. The board's controls over entries and exits were sharply reduced with remaining control over entry to expire at the end of 1981. CAB control over air fares was reduced, and remaining CAB controls over fares will cease on January 1, 1983. The board itself is slated to expire on January 1, 1985, and responsibility for decisions involving discriminatory or predatory pricing, etc. and merger cases will pass to the Justice Department. The Department of Transportation will assume responsibility for administering the subsidy program for air service. The continuing subsidy program will result largely from one of the act's most significant features from the standpoint of Arizona air service. The act guarantees "essential" air service to "eligible" points for a ten-year period following passage of the act.

It is still much too early to evaluate the probable long-term outcome of this legislation. The effect of the new law at this time, however, can be analyzed with respect to Phoenix and Tucson, and the effects on the smaller Arizona communities. Braniff, Eastern Airlines, Northwest Airlines, PSA, Republic, and USAir (Allegheny) have entered one or both of these markets, and these carriers will probably be joined in the near future by Ozark and United Airlines with still others possibly following. Service levels are clearly up in some respects, e.g., more carriers and more nonstop flights. The number of flights serving Phoenix increased from 1,049 on Sept. 1, 1978 to 1,355 on Sept. 1, 1979, a 29 percent increase. The total number of seats on these flights increased by a lesser amount — about 18.7 percent. During the same period flights in Tucson increased approximately 21 percent and number of available seats increased 19.5 percent. Phoenix and Tucson both have relatively high levels of service for cities of comparable size although neither is a significant operating hub for airlines. Operating hubs that serve as connecting points for flights generate a high level of flight activity relative to the volume of traffic actually originating or terminating at the airport. Over 70 percent of the traffic that moves through Atlanta's Hartsfield Airport, for example, is made up of connecting passengers. On the other hand, the relatively high number of flights serving Phoenix and Tucson is partly a reflection of the high tourist traffic these cities generate.

Virtually all of the routes being served by the new carriers were previously being served, however, and the increased number of carriers and flights are not without their problems, (such as airport congestion). Some observers think that excessive competition will develop as a result of deregulation and that this will be detrimental to a stable system of air transportation. However, even if problems do arise on some routes and for some carriers,

Phoenix and Tucson both appear to be well positioned to retain a relatively high overall level of air service.

In the near future, the fate of air service to Arizona's small cities rests primarily upon the guaranteed air service provisions of the Deregulation Act. By constitutional provision, the State of Arizona is not permitted to give financial aid to private entities. Therefore, the main role of the state agencies with respect to air service occurs when the Arizona Department of Transportation intervenes on behalf of communities in seeking service under the Deregulation Act's provisions or in seeking other types of federal aid.

As noted, the Deregulation Act guarantees essential air transportation to eligible points for ten years after the act became law. Basically, a point is eligible for guaranteed essential air transportation if, on the date of enactment of the act, any carrier: (a) was providing service pursuant to a certificate issued to such carrier under Section 401 of the Federal Aviation Act; or (b) was authorized, pursuant to such certificate, to provide such service, but such service was suspended on the date of enactment of the Deregulation Act.

The act defines essential air transportation as:

scheduled air transportation of persons to a point provided under such criteria as the Board determines satisfies the needs of the community concerned for air transportation to one or more communities of interest and insures access to the Nation's air transportation system, at rates, fares and charges which are not unjust, unreasonable, unjustly discriminatory, unduly preferential, or unduly prejudicial.

The CAB makes its determination "after considering the views of any interested community, and the state agency (ADOT) of the state in which each community is located." In addition to the points included in the above conditions, beginning in 1982 the CAB may declare eligibility for subsidy, service to points deleted from certificates between July 1, 1968 and October 16, 1978 (e.g., Douglas).

In November, 1979, the initial decision of the board under this act relating to guaranteed air transportation resulted in the proposed service levels indicated in Table 1. Since that time the Arizona Department of Transportation has appealed the CAB decision which reduced the available number of seats eligible for subsidy on daily flights serving Kingman and Prescott. The Arizona Department of Transportation recommended thirty seats a day between Prescott and both Phoenix and Las Vegas, and the same level of service between Kingman and the same two cities. This recommendation, in part, reflected efforts to encourage the establishment of service in nineteen-passenger, pressurized, turboprop aircraft rather than with the smaller, twin-engine aircraft that could provide the service levels set by the

TABLE 1
GUARANTEED AIR TRANSPORTATION FOR ELIGIBLE POINTS IN ARIZONA

Community	*Original Potential Carrier(s)*	*Number of Roundtrip Flights*	*Total Number of Seats Per Day or Weekend*	*Destination*
Flagstaff	Desert Air Services** Cochise Airlines Sky West Aviation	Two daily (nonstop)	80 each way	Phoenix
Grand Canyon	Air West	Two daily (nonstop)	80 each way	Las Vegas
Kingman	Cochise Airlines*	Two daily, M-F Two on weekends (one stop service permitted)	6 each way	Phoenix
Page	Sky West Aviation*	Two daily, M-F Two on weekends (two stop service permitted)	26 each way	Phoenix or Las Vegas
Prescott	Cochise Airlines*	Two daily, M-F Two on weekends (nonstop)	8 each way	Phoenix
Winslow	Cochise Airlines Desert Air Services**	Two daily, M-F Two on weekends	6 each way	Phoenix
Yuma	Cochise Airlines* Imperial Airlines Sun Aire Baja Cortez	Two daily	80 each way	Phoenix and Los Angeles

*Carrier actually offering subsidized service as of August, 1980.
**No longer in operation.
Source: Civil Aeronautics Board.

CAB. The cities of Kingman and Prescott have also appealed to CAB decision. It is likely that Douglas, which at one time received subsidized service, will seek new service under the Deregulation Act when it becomes eligible to do so in 1982.

A study done for the Four Corners Regional Commission identified five routes in which the annual economic benefits would exceed total annual service costs (subsidy): (1) Holbrook-Show Low-Phoenix, (2) Sedona-Phoenix, (3) Phoenix-Tucson-Sierra Vista, (4) Winslow-Flagstaff-Phoenix, and (5) Page-Kanab, Utah-St. George, Utah.[4] The study also suggested that these routes could be free of subsidy within five years of initiating operations.

Funding for air service has also been available from some federal sources other than the CAB. The Four Corners Regional Commission sought to obtain $7.3 million for expansion of air service between Kingman, Prescott and Phoenix and Las Vegas. The funding would have come from a three-year White House Rural Development Initiatives Task Force Program. Budget cuts, however, blocked the funds.

Depending on the city and the evaluator, differences occur in the evaluations of the adequacy of the levels of service deemed eligible for subsidy by the CAB. Individual cities naturally are concerned with specific routes, number of flights, number of seats on flights, etc. For example, both Prescott and Kingman hoped for guaranteed service to Las Vegas as well as to Phoenix, and Yuma has been particularly concerned about the size of aircraft providing service to that city.

The overall effects of the Deregulation Act (along with other factors such as economic conditions) have been mixed. Generally service has been improved by more frequent flights, flights at more convenient times, and flights to more points. In some cases the substitution of smaller aircraft has resulted in a deterioration of one facet of service levels. It seems likely, however, that service by larger aircraft to the smaller cities would have been further curtailed eventually even without deregulation as a result of the economic realities arising from the increasing costs of fuel, load factor requirements, etc.

It should be emphasized that service to a number of smaller Arizona cities is presently provided by commuter airlines without benefit of subsidy. Among Arizona cities receiving scheduled service by commuter airlines in August, 1980, were Bagdad, Lake Havasu, Sedona, Taylor, Show Low, Douglas, Sierra Vista, and Whiteriver. At that time there were twelve commuter airlines serving Arizona points with only two of these receiving subsidy on service to some points. The commuter sector of the airline industry has had a significant level of entry and exit. This is true in terms of firms going into and out of the commuter airlines business, and in terms of commuter airlines that continue in business but enter new markets and exit markets previously served. This is likely to continue in the future. Indeed, the rest of the airline industry will undoubtedly be characterized by a much higher level of entry and exit in the future than in the past with respect to both carriers and particular markets.

An especially critical factor in the long-term success of commuter airlines is safety. The safety record of commuter airlines has been less than satisfactory, and the Federal Aviation Agency (FAA) has substantially increased safety standards for safety equipment, pilot training, maintenance requirements, etc.; it has also increased the number of inspections it performs. The desire to foster safety and dependability is one of the reasons the Arizona Department of Transportation (ADOT) is seeking to ensure that local service is provided by aircraft of nineteen-passenger size or larger, where practical. The fact that the larger aircraft are more likely to be pressurized is a significant factor in terms of dependability of service and potential comfort for passengers as well.

Another critical factor in the success of commuter airlines is access to an adequate airport system. It is beyond the scope of this paper to discuss airports in detail, but it should be noted that ADOT is actively involved along with the FAA and individual cities in planning and financing efforts to assure an effective system of airports.

AIR FREIGHT

Although this article is primarily concerned with air passenger transportation, a brief comment on air freight may be useful. Congress completed deregulation of air freight in October, 1978. Today, any firm may enter the air freight business (subject to Federal Aviation Administration certification regarding safety, etc.), on any routes, with only the normal constraints on pricing, such as anti-trust laws.

As with passenger service, it is still too early to evaluate the ultimate effect on the price and quality of air freight service that deregulation will have. In the short run, however, it is ironic that the deregulation of passenger service has probably had more of an effect on freight service in some Arizona communities than the deregulation of freight itself. In communities such as Yuma, the local service carriers (Hughes Airwest, for example) halted service with their relatively large jet aircraft and were replaced by airlines, such as Cochise,

with much smaller aircraft. These smaller aircraft have limited capacity for "belly" freight. In a situation where passenger service might be improved by substituting three flights with small aircraft for a single flight with one large aircraft, freight service might suffer because of the reduction in airlift or freight capacity. This is, of course, especially critical for large individual pieces of freight. Cochise has instituted service to Yuma with a relatively large Convair turboprop aircraft mainly to cope with complaints about inadequate freight capacity.

The Motor Carrier Act of 1980 exempted from economic regulation freight movements by truck that are a part of a continuous movement and have a prior or subsequent movement by an air carrier. This permits the airlines to offer combined air and highway service to many points using cities such as Phoenix as hubs. Direct freight service for Phoenix and Tucson is primarily in the form of combination passenger-freight flights with the exception of all cargo service offered by Federal Express, which primarily handles small shipments.

LOOKING AHEAD

The regulatory and economic changes that are still taking place in the airline industry make it especially difficult to forecast the long-term future of this industry. Air travel on the major domestic carriers was down by 5 percent in the first eight months of 1980 as compared with the same period in 1979. In October, 1980, air fares were up by more than 30 percent over the same time a year earlier. However, yields (actual revenues per passenger mile) were not up by a corresponding amount because more passengers are using discount fares. Approximately 66 percent of the passengers on major airlines flew on discount fares in summer of 1980. Airlines are continuing to raise fares and are increasing restrictions on discount fares; furthermore, many airlines are reducing the amounts of the discounts. The continuing escalation of fuel costs hits the airline industry extremely hard. As recently as 1973, fuel costs represented only about 12 percent of airline operating costs, but by the middle of 1980 fuel costs had grown to over 30 percent of airline operating costs.

There will almost certainly be some business failures among the commuter airlines, and the traumatic conditions affecting the industry may even lead to some failures among the major carriers. It is highly likely that more mergers will occur, such as between Continental Airlines and Western Airlines, in addition to those mergers and acquisitions that have recently taken place, as in Republic's acquisition of Hughes Airwest.

Despite the recent drop in passengers carried by the airlines, there is little doubt that the long-term trend will be upward. The Federal Aviation Agency forcast 500 million passengers annually by the end of this decade — up from 317 million passengers in 1979.

The reduction and eventual removal of economic regulation should permit airline management to respond more rapidly and effectively to the changing circumstances the industry will face. For individual firms the results may sometimes be disastrous, but the industry as a whole and the public should ultimately benefit from reduced regulation. It might be noted that the benefits may be partially obscured due to such factors as rising fuel costs and the need to replace or retrofit some aircraft to meet stricter noise standards.

SUMMARY

Air service to Phoenix and Tucson is expected to continue at a satisfactory level in the future. At least seven Arizona cities will be assured "essential" air service approximately through 1988; however, there may be some dispute about the adequacy of the levels determined by the CAB to be "essential." Subsidies from federal sources other than the CAB (the Department of Transportation when the CAB expires) are possible in the future, but these are likely to be limited to experimental programs and, if available at all, will probably be restricted to a very limited number of communities and for limited periods of time. Some market segments, particularly those that receive no federal subsidy, will likely experience service levels that fluctuate as airlines enter and exit those markets. The overall development of commuter airline service in Arizona will depend on a wide variety of factors including economic conditions, safety records, and adequacy of airports.

---

[1] *Air Transport 1979*. Air Transport Association. Washington, D.C. June 1, 1979, p. i.

[2] "Losses Greater than Forecast," *Aviation Week and Space Technology*. August 4, 1980, pp. 28-29.

[3] Subsidies to trunk lines were ended in 1955, with the exception of Northeastern Airlines which was receiving subsidy at the time of its merger with Delta Air Lines.

[4] *Four Corners Commuter Air Service Study*, prepared by Landrum and Brown Aviation Consultants (Booz-Allen and Hamilton, Inc.); funded by the Four Corners Regional Commission, no date, pp. 14-17.

The Arizona Business Scene

Transportation in Arizona: An Overview

The three major modes of transportation in Arizona — highway, air, and railroad — move both people and goods, while the fourth mode of transportation — pipelines — moves only specific types of goods. The state's geography, size, and population distribution dictate that certain modes of transportation — auto, truck, and airplane — are more heavily utilized in Arizona than in most other states.

The transportation industry in Arizona employed an average of 22,100 people in 1979, 2.3 percent of the state's total employment. From 1970 to 1979, transportation employment grew 55 percent, a slightly slower growth rate than employment as a whole.

The highway system in Arizona consists of some 56,000 miles of road. Numerous types of motor vehicles use these roads: private passenger vehicles (automobiles, pickup trucks, motorcycles), public passenger vehicles (buses, vans, and taxis), and trucks for the transportation of goods. A summary of motor vehicle statistics is provided in Table 1. Highways and passenger transportation are discussed in depth in other articles of this issue.

The commercial trucking industry moves much of the freight in Arizona. Trucks are ideally suited to carry goods to the small, widely dispersed communities throughout Arizona. Many communities are almost totally dependent on trucking for business and consumer products.

TABLE 1

MOTOR VEHICLE TRANSPORTATION STATISTICS

	Registrations			
	All Vehicles	*Passenger Vehicles*	*Motor Vehicle Mileage*	*Motor Vehicle Fuel Consumption*
1970	1,310,738	827,579	12,122,438,000	1,023,461,000
1979	2,037,278	1,259,866	19,248,962,000	1,536,230,000
Percentage Change	55	66	59	50

Source: Arizona Department of Transportation, Motor Vehicle Division.

There are 7,100 for-hire motor carriers operating in Arizona. These carriers move nearly 70 percent of the agricultural goods in Arizona and most of the manufactured commodities. Some of these carriers move goods intrastate only, but most are interstate carriers, moving goods into and out of Arizona as well as from community to community within Arizona.

Because of the distance between Arizona communities and from major population centers in other states, air service is of considerable importance in Arizona. Two major airports, Phoenix Sky Harbor International and Tucson International, are the primary centers for both air freight service and passenger travel. Phoenix Sky

Harbor airport, which recently completed a major expansion, is now the eleventh largest airport in the United States in number of flights and twenty-sixth largest in number of airline passengers. Phoenix is served by nineteen airlines; Tucson is served by eleven airlines. Growth statistics for these airports are shown in Table 2. In addition to these two large airports, several other airports throughout the state are served by commercial airlines, and numerous small general aviation airports handle other aircraft.

TABLE 2

AIR TRANSPORTATION STATISTICS

	Phoenix		*Tucson*	
	Passengers	*Air Freight*	*Passengers*	*Air Freight*
1970	2,871,900	37,965,000	922,100	15,595,000•
1979	7,021,985	70,363,000	1,948,200	17,453,000
Percentage Change	144	85	111	12

•Estimated

Sources: City of Phoenix Aviation Department, Tucson Airport Authority

Due to Arizona's mountainous terrain and widely dispersed small population centers, rail service is relatively less important in Arizona than in most states. About 2,000 miles of railroad track are operational in the state, and no new track has been added for a number of years. For a more complete discussion of rail operations, refer to the accompanying article on "Arizona's Railroad System."

The importance of pipelines as a mode of transportation is generally not recognized. Yet pipelines are unobtrusive, safe, and generally economical. While pipelines are highly specialized in what they carry, their importance to what they do carry is significant: Over 70 percent of Arizona's energy requirements are dependent upon pipelines. There are major pipelines in Arizona for each of the following products: petroleum products, crude oil, natural gas, and coal slurry.

While certain modes of transportation are more suitable for Arizona's geography and population distribution, all are important aspects of Arizona's economy. Transportation plays a major role in shaping local development by molding the location of economic activity, the size and spread of cities, and the style and pace of life. This is demonstrated by the development of both urban and rural areas in Arizona. However, current and potential problems do exist within Arizona's transportation network. Phoenix confronts problems now as its rapid growth has exceeded the growth of its roads and highways. The entire state faces a future problem financing highway maintenance and construction. Arizona, like the entire country, faces potential problems of availability and cost of energy to fuel its transportation.

A Survey of Arizona Business Conditions

HAROLD FEARON

The recession bottomed out in July; the beginnings of an upturn were evident in August; and the economy continued to gain strength in September, according to the monthly business survey of the Purchasing Management Association of Arizona. For the first time since last March the indicators of new orders received, production, and employment all were positive, giving good evidence that the recession is over and the Arizona economy once again has resumed an upward path.

The purchasing business survey now is beginning its nineteenth year of consecutive monthly reporting on the current status of the Arizona economy. Data are gathered through a questionnaire sent at the close of each month to purchasing managers throughout the state, asking them to indicate the direction of activity — higher, unchanged, or lower — on six key indicators of economic activity in the month just ended. Since these purchasing managers deal daily with the forces of supply and demand, they are in a prime position to provide timely and accurate information on current business trends, which enables economic turning points to be spotted.

Prices paid for major purchased items moved up again in September at a higher month-to-month increase rate than in August and the highest rate since last May. Higher prices were reported by 52 percent of the purchasing managers; 43 percent said prices were unchanged; and 5 percent paid lower prices in September than in August. After eight months of a declining price increase trend which began last January, it now appears that the direction has changed as economic growth resumes, and the inflation rate will become more pronounced in the fourth quarter. While the monthly price increase rate still is much lower than recorded during the first part of the year, the problem of an unacceptably high price increase rate still is with us and likely will intensify over the next several months.

Delivery time on shipments from vendors lengthened, and at a rate twice as great as in August. Faster deliveries were reported by 16 percent of the firms, but 23 percent saw a stretch-out in vendor delivery times. This was the second month in which longer delivery times were reported, following three months (May through July) when Arizona firms got faster service from their suppliers. This reinforces the assessment that the low point in the current business cycle has been passed and the Arizona economy again is in an upswing.

Inventory levels of purchased materials dropped still further in September, but the decrease was quite small, with 26 percent of the firms adding to inventory compared to 30 percent who pared stocks. This was the sixth consecutive month of inventory reductions. The reductions have been decreasing over each of the past four months, and the small reduction in September (the lowest of any of the six monthly reductions) indicates that the inventory liquidations are about over. This will end the inventory drag on the economy, as firms again

*Dr. Fearon is Professor of Management in the College of Business Administration at Arizona State University.

begin to buy goods to support current production instead of meeting production demands from purchased materials bought in some previous time period. One of the key reasons for the short duration of the past recession has been that inventory imbalances have not been severe and major inventory reductions were not necessary.

New orders received from customers increased in September for the second consecutive month, and at a strong rate, following the net reductions in the four months of April through July. An increase in order bookings was reported by 39 percent of the firms, compared to the 25 percent who received less new business in September than in August. This was the largest monthly increase rate in a year (since September, 1979) and shows that the drop in vitality suffered by the Arizona economy was only temporary and now has been corrected.

Production went up, for the second consecutive month, and at a rate substantially higher than in August. Higher production was reported by 32 percent of the firms; only 26 percent had reduced output. Production follows the new order rate closely and can be expected to increase further over the next several months.

Employment in Arizona firms turned positive in September, for the first month following the four decreases (May through August) during the recession. Higher employment was reported by 23 percent of the firms, while 18 percent pared payrolls. This was the largest monthly increase since last February and provides further evidence that the recession is behind us and the Arizona economy once again is moving upward.

Thus, all economic indicators in September point to an upswing. The recession lasted only four months, which was short, and it was quite shallow in its effects on the Arizona economy. There is no guarantee that the current recovery will be strong or of long duration, but it is starting out on a very positive note and the fourth quarter should see good economic advances.

The results of the September survey are shown in Table 1.

TABLE 1
SEPTEMBER PURCHASING SURVEY

	Percent of Purchasing Managers Indicating Each Response (September compared to August)		
Key Indicators	*Higher*	*Same*	*Lower*
Prices paid for major commodities	52	43	5
Delivery time from vendors	23	61	17
Purchased materials inventory level	26	44	30
New orders received	39	36	25
Production	32	42	26
Employment	23	59	18

Source: Survey of the Purchasing Management Association of Arizona.

ARIZONA SALES OF ELECTRICAL POWER
By Month
(In millions of kwh)

	Actual		*Percent Change Current Month From*	
	1980	*1979*	*Same Month Previous Year*	*Previous Month*
August	3,165.8	2,997.0	5.6	-4.5

Source: Based on reports from major suppliers.

Arizona New Housing Starts: Monthly Report

AUGUST, 1980

	BUILDING PERMITS ISSUED				
	1* Family	Duplex	3-4 Families	5 or More	Housing Units
APACHE COUNTY	5	—	—	—	5
Eagar	5	—	—	—	5
St. Johns	—	—	—	—	—
Springerville	—	—	—	—	—
Uninc. Apache Co.	—	—	—	—	—
COCHISE COUNTY	73	—	—	—	73
Benson	1	—	—	—	1
Bisbee	—	—	—	—	—
Douglas	6	—	—	—	6
Huachuca City	—	—	—	—	—
Sierra Vista	40	—	—	—	40
Tombstone	2	—	—	—	2
Uninc. Cochise Co.	20	—	—	—	20
Willcox	4	—	—	—	4
COCONINO COUNTY	122	—	—	—	122
Flagstaff	37	—	—	—	37
Fredonia	1	—	—	—	1
Page	19	—	—	—	19
Uninc. Coconino Co.	65	—	—	—	65
Williams	—	—	—	—	—
GILA COUNTY	42	1	—	1	49
Globe	2	1	—	—	4
Hayden	—	—	—	—	—
Miami	—	—	—	—	—
Payson	19	—	—	1	24
Uninc. Gila Co.	21	—	—	—	21
GRAHAM COUNTY	26	—	—	—	26
Pima	3	—	—	—	3
Safford	4	—	—	—	4
Thatcher	1	—	—	—	1
Uninc. Graham Co.	18	—	—	—	18
GREENLEE COUNTY	—	—	—	—	—
Clifton	—	—	—	—	—
Duncan	—	—	—	—	—
Uninc. Greenlee Co.	—	—	—	—	—
MARICOPA COUNTY	1,967	18	26	17	2,542
Avondale	7	—	—	—	7
Buckeye	—	—	—	—	—
Chandler	233	—	6	—	257
El Mirage	—	—	—	—	—
Gila Bend	2	—	—	—	2
Gilbert	21	—	—	—	21
Glendale	184	—	—	1	200
Goodyear	—	—	—	—	—
Guadalupe	2	—	—	—	2
Mesa	232	15	2	2	420
Paradise Valley	10	—	—	—	10
Peoria	51	—	—	—	51
Phoenix	605	3	11	3	814
Scottsdale	124	—	—	—	124
Surprise	1	—	—	—	1
Tempe	76	—	7	11	214
Tolleson	—	—	—	—	—
Uninc. Maricopa Co.	149	—	—	—	419
Wickenburg	—	—	—	—	—
Youngtown	—	—	—	—	—

	BUILDING PERMITS ISSUED				
	1* Family	Duplex	3-4 Families	5 or More	Housing Units
MOHAVE COUNTY	175	—	—	1	225
Kingman City	10	—	—	—	10
Kingman Area	26	—	—	—	26
Lake Havasu City	52	—	—	1	102
Lake Havasu Area	8	—	—	—	8
Mohave Valley North	41	—	—	—	41
Mohave Valley South	21	—	—	—	21
Dolan Springs	7	—	—	—	7
Sacramento Valley	6	—	—	—	6
Mohave Co. General	4	—	—	—	4
NAVAJO COUNTY	104	—	—	—	104
Holbrook	5	—	—	—	5
Show Low	6	—	—	—	6
Snowflake	6	—	—	—	6
Taylor	3	—	—	—	3
Uninc. Navajo Co.	83	—	—	—	83
Winslow	1	—	—	—	1
PIMA COUNTY	531	13	6	7	650
Marana	1	—	—	—	1
Oro Valley	1	—	—	—	1
South Tucson	1	—	—	—	1
Tucson	158	11	6	7	273
Uninc. Pima Co.	370	2	—	—	374
PINAL COUNTY	64	—	3	—	76
Casa Grande	17	—	1	—	21
Coolidge	5	—	—	—	5
Eloy	—	—	—	—	—
Florence	—	—	—	—	—
Kearny	2	—	—	—	2
Mammoth	—	—	—	—	—
Superior	1	—	—	—	1
Uninc. Pinal Co.	39	—	2	—	47
SANTA CRUZ COUNTY	10	—	—	—	10
Nogales	N/R	N/R	N/R	N/R	N/R
Patagonia	1	—	—	—	1
Uninc. Santa Cruz Co.	9	—	—	—	9
YAVAPAI COUNTY	150	—	1	1	159
Chino Valley	14	—	—	—	14
Clarkdale	1	—	—	—	1
Cottonwood	5	—	—	—	5
Jerome	N/R	N/R	N/R	N/R	N/R
Prescott	12	—	—	—	12
Uninc. Yavapai Co.	87	—	—	1	93
Prescott Valley	31	—	1	—	34
YUMA COUNTY	63	1	—	—	65
Parker	—	—	—	—	—
Somerton	2	—	—	—	2
Uninc. Yuma Co.	40	—	—	—	40
Wellton	—	—	—	—	—
Yuma	21	1	—	—	23
TOTAL, Maricopa Co., August, 1980	1,967	18	26	17	2,542
TOTAL, Maricopa Co., August, 1979	1,820	25	22	40	3,083
PERCENT CHANGE	8	-28	18	-57	-18
TOTAL, Arizona, August, 1980	3,332	33	36	27	4,106
TOTAL, Arizona, August, 1979	3,617	37	43	50	5,328
PERCENT CHANGE	-8	-11	-16	-46	-23

*Includes mobil homes

N/R: No report; data for this month will be combined with data reported for the following month.

AUGUST, 1980

Arizona Building Permits: Monthly Report

	RESIDENTIAL*		COMMERCIAL		INDUSTRIAL		OTHER		TOTAL	
	Number of Permits	*Dollar Value*	*Number of Permits*	*Dollar Value*	*Number of Permits*	*Dollar Value*	*Number of Permits*	*Dollar Value*	*Number of Permit*	*Dollar Value*
APACHE COUNTY	9	189,700	—	—	—	—	1	1,000	10	190,700
Eagar	6	170,700	—	—	—	—	1	1,000	7	171,700
St. Johns	—	—	—	—	—	—	—	—	—	—
Springerville	1	N/C	—	—	—	—	—	—	1	N/C
Uninc. Apache Co.	2	19,000	—	—	—	—	—	—	2	19,000
COCHISE COUNTY	139	2,802,472	11	293,726	—	—	89	321,398	239	3,417,596
Benson	2	18,750	2	14,000	—	—	2	3,500	6	36,250
Bisbee	28	21,016	—	—	—	—	1	92,000	29	113,016
Douglas	14	384,198	1	125,026	—	—	15	40,585	30	549,809
Huachuca City	8	7,730	—	—	—	—	1	2,500	9	10,230
Sierra Vista	53	1,555,244	1	40,000	—	—	56	78,658	110	1,673,902
Tombstone	3	4,500	1	19,000	—	—	4	1,075	8	20,575
Uninc. Cochise Co.	26	620,459	6	99,700	—	—	10	103,080	42	823,239
Willcox	5	190,575	—	—	—	—	—	—	5	190,575
COCONINO COUNTY	244	4,884,587	4	981,244	1	750	60	776,060	309	6,642,641
Flagstaff	71	2,606,623	4	981,244	—	—	30	680,918	105	4,268,785
Fredonia	3	7,600	—	—	1	750	5	17,500	9	25,850
Page	26	508,470	—	—	—	—	5	50,000	31	558,470
Uninc. Coconino Co.	144	1,761,894	—	—	—	—	4	8,340	148	1,770,234
Williams	—	—	—	—	—	—	16	19,302	16	19,302
GILA COUNTY	65	1,013,587	11	253,770	—	—	42	76,076	118	1,343,433
Globe	12	117,100	—	—	—	—	1	40,000	13	157,100
Hayden	—	—	—	—	—	—	—	—	—	—
Miami	2	1,900	—	—	—	—	1	500	3	2,400
Payson	21	329,769	10	214,803	—	—	35	26,076	66	570,648
Uninc. Gila Co.	30	564,818	1	38,967	—	—	5	9,500	36	613,285
GRAHAM COUNTY	39	588,316	2	150,500	—	—	5	9,850	46	748,666
Pima	3	19,200	—	—	—	—	—	—	3	19,200
Safford	14	158,300	2	150,500	—	—	3	850	19	309,650
Thatcher	1	50,000	—	—	—	—	2	9,000	3	59,000
Uninc. Graham Co.	21	360,816	—	—	—	—	—	—	21	360,816
GREENLEE COUNTY	1	2,000	—	—	—	—	1	400	2	2,400
Clifton	—	—	—	—	—	—	—	—	—	—
Duncan	1	2,000	—	—	—	—	1	400	2	2,400
Uninc. Greenlee Co.	—	—	—	—	—	—	—	—	—	—
MARICOPA COUNTY	2,574	73,172,396	117	28,971,566	48	7,466,868	1,663	17,262,143	4,402	126,872,973
Avondale	8	141,500	1	65,000	—	—	5	100,200	14	306,700
Buckeye	4	9,700	—	—	—	—	1	25,000	5	34,700
Chandler	248	7,446,794	7	604,560	—	—	235	545,401	490	8,596,755
El Mirage	—	—	—	—	—	—	—	—	—	—
Gila Bend	2	41,000	—	—	—	—	—	—	2	41,000
Gilbert	28	1,089,840	—	—	1	5,000	12	40,401	41	1,135,241
Glendale	213	6,041,575	16	2,777,000	—	—	228	1,166,752	457	9,985,327
Goodyear	—	—	1	150,000	—	—	8	847,899	9	997,899
Guadalupe	4	38,100	—	—	—	—	—	—	4	38,100
Mesa	278	4,934,229	6	4,557,975	1	13,000	225	1,450,750	510	10,955,954
Paradise Valley	16	1,278,000	—	—	—	—	60	184,872	76	1,462,872
Peoria	54	1,286,510	2	3,200	1	25,600	6	28,744	63	1,344,054
Phoenix	827	28,846,797	33	15,583,274	16	4,235,168	550	8,748,143	1,426	57,413,382
Scottsdale	158	6,410,990	5	796,137	—	—	170	1,331,040	333	8,538,167
Surprise	2	16,200	—	—	—	—	4	8,350	6	24,550
Tempe	120	2,793,400	33	3,971,600	29	3,188,100	49	1,919,400	231	11,818,500
Tolleson	8	24,521	—	—	—	—	—	—	8	—
Uninc. Maricopa Co.	584	12,812,668	13	462,820	—	—	103	737,415	700	14,012,903
Wickenburg	—	—	—	—	—	—	—	—	—	—
Youngtown	20	14,572	—	—	—	—	7	127,776	27	142,348

Arizona Building Permits: Monthly Report (Continued)

AUGUST, 1980

	RESIDENTIAL*		COMMERCIAL		INDUSTRIAL		OTHER		TOTAL	
	Number of Permits	*Dollar Value*	*Number of Permits*	*Dollar Value*	*Number of Permits*	*Dollar Value*	*Number of Permits*	*Dollar Value*	*Number of Permit*	*Dollar Value*
MOHAVE COUNTY	283	4,404,967	19	1,122,071	—	—	201	426,618	503	5,953,656
Kingman City	24	382,983	7	339,800	—	—	9	10,075	40	732,858
Kingman Area	40	367,772	—	—	—	—	36	28,372	76	396,144
Lake Havasu City	59	1,930,652	3	566,090	—	—	10	49,113	72	2,545,855
Lake Havasu Area	16	155,744	—	—	—	—	6	12,563	22	168,307
Mohave Valley North	72	861,443	8	150,648	—	—	90	234,259	170	1,246,350
Mohave Valley South	37	375,916	1	65,533	—	—	33	67,252	71	508,701
Dolan Springs	17	132,286	—	—	—	—	13	18,174	30	150,460
Sacramento Valley	8	115,353	—	—	—	—	4	6,810	12	122,163
Mohave County General	10	82,818	—	—	—	—	—	—	10	82,818
NAVAJO COUNTY	170	3,395,800	2	232,000	—	—	7	801,200	179	4,429,000
Holbrook	7	246,900	—	—	—	—	—	—	7	246,900
Show Low	8	32,956	2	232,000	—	—	2	1,200	12	266,156
Snowflake	6	N/C	—	—	—	—	4	N/C	10	N/C
Taylor	3	180,500	—	—	—	—	—	—	3	180,500
Unic. Navajo Co.	141	2,856,444	—	—	—	—	—	—	141	2,856,444
Winslow	5	79,000	—	—	—	—	1	800,000	6	879,000
PIMA COUNTY	739	27,337,387	43	11,872,732	—	—	512	6,867,073	1,294	46,077,192
Marana	1	N/C	—	—	—	—	—	—	1	N/C
Oro Valley	1	45,000	—	—	—	—	—	—	1	45,000
South Tucson	14	52,569	2	3,500	—	—	—	—	16	56,069
Tucson	268	5,189,525	30	7,192,852	—	—	227	5,260,919	525	17,643,276
Uninc. Pima Co.	455	22,050,293	11	4,676,400	—	—	285	1,606,154	751	28,332,847
PINAL COUNTY	90	1,633,880	6	270,700	—	—	42	258,175	138	2,162,755
Casa Grande	20	735,121	1	105,700	—	—	11	59,964	32	900,785
Coolidge	9	48,536	—	—	—	—	2	15,000	11	63,536
Eloy	1	3,300	—	—	—	—	1	5,779	2	9,079
Florence	2	2,000	—	—	—	—	4	12,350	6	14,350
Kearny	3	35,500	—	—	—	—	2	20,000	5	55,500
Mammoth	1	18,000	1	55,000	—	—	—	—	2	73,000
Superior	1	N/C	1	5,000	—	—	1	1,500	3	6,500
Uninc. Pinal Co.	53	791,423	3	105,000	—	—	21	143,582	77	1,040,005
SANTA CRUZ COUNTY	10	527,667	—	—	—	—	2	14,991	12	542,658
Nogales	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
Patagonia	1	30,000	—	—	—	—	—	—	1	30,000
Uninc. Santa Cruz Co.	9	497,667	—	—	—	—	2	14,991	11	512,658
YAVAPAI COUNTY	265	4,443,517	11	823,689	—	—	88	234,011	364	5,501,217
Chino Valley	20	311,466	—	—	—	—	10	9,460	30	320,926
Clarkdale	8	60,200	—	—	—	—	—	—	8	60,200
Cottonwood	15	92,797	1	45,500	—	—	—	—	16	138,297
Jerome	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R
Prescott	44	450,712	2	197,777	—	—	46	92,164	92	740,653
Uninc. Yavapai Co.	132	2,932,367	5	486,500	—	—	31	122,787	168	3,541,654
Prescott Valley	46	595,975	3	93,912	—	—	1	9600	50	699,487
YUMA COUNTY	99	2,275,756	2	146,833	—	—	38	682,855	139	3,105,444
Parker	2	16,600	—	—	—	—	—	—	2	16,600
Somerton	2	75,000	—	—	—	—	2	2,000	4	77,000
Uninc. Yuma Co.	50	919,687	1	99,520	—	—	9	424,632	60	1,443,839
Wellton	—	—	—	—	—	—	—	—	—	—
Yuma	45	1,264,469	1	47,313	—	—	27	256,223	73	1,568,005
TOTAL Maricopa County, August, 1980	2,574	73,172,396	117	28,971,566	48	7,466,868	1,663	17,262,143	4,402	126,872,973
TOTAL Maricopa County, August, 1979	2,521	61,566,778	182	52,758,959	64	13,048,130	2,053	20,727,573	4,820	148,101,440
PERCENT CHANGE	2	19	-36	-45	-25	-43	-19	-17	-9	-14
TOTAL Arizona, August, 1980	4,727	126,672,032	228	45,118,831	49	7,467,618	2,751	27,731,850	7,755	206,990,331
TOTAL Arizona, August, 1979	5,636	115,825,392	312	78,489,882	72	13,546,882	2,919	33,190,703	8,939	241,052,798
PERCENT CHANGE	-16	9	-27	-43	-32	-45	-6	-16	-13	-14

N/C: Not collected. N/R: No report; data for this month will be combined with data reported for the following month.
*Includes mobile homes.

Maricopa County Retail Food Prices

SEPTEMBER, 1980

Retail food prices in Maricopa County rose 1.9 percent in September. This gain, which follows a 1.3 percent increase in August, is the largest monthly increase since December, 1979.

The food price survey is compiled by the Bureau of Business and Economic Research, College of Business Administration, at Arizona State University. Cosponsor of the study is Valley National Bank. The September index of 249.5 indicates that shoppers would now have to pay $24.95 for a similar basket of foods that would have cost $10.00 in 1967. These foods could have been purchased for $22.18 one year ago. The September, 1980, index reflects a 12.5 percent increase over the September, 1979, value.

Gains in all but one of the subgroups were responsible for the higher September index. Prices in the *Fruits and Vegetables* subgroup jumped 6.2 percent, followed by *Meats, Poultry, Fish, and Eggs*, up 2.1 percent. *Other Foods* and *Dairy Products* both rose 1.1 percent, while *Cereal and Bakery Products* declined 0.8 percent.

The surge in lettuce prices (67.3 percent) accounted for a large part of the increase in *Fruits and Vegetables*. Prices of most other items in this category also climbed, notably potatoes (24.2 percent), bananas (13.6 percent), and oranges (10.5 percent).

Prices continue to escalate in the *Meats, Poultry, Fish, and Eggs* subgroup. All pork items rose this month, especially bacon (8.2 percent), pork chops (6.5 percent), and noncanned ham (3.6 percent). Also increasing were fresh and frozen chicken parts (11.0 percent), eggs (6.1 percent), and rib roasts (5.9 percent). Slightly offsetting these hikes were declining prices for frankfurters (-8.7 percent), and chuck roast (-2.7 percent).

Contributing to the increase in the *Other Foods* category were rising prices for frozen prepared foods (4.6 percent), carbonated drinks (3.3 percent), and sugar/artificial sweeteners (2.6 percent). These gains were only partially offset by a decline in nuts, potato chips, and other snacks (-0.9 percent).

All items in the *Dairy Products* subgroup climbed during the month of September. Largest increases were butter (3.6 percent), followed by ice cream and related products (2.2 percent), and cheese (1.7 percent).

The slight decrease in *Cereal and Bakery Products* can be attributed partially to the dip in the prices of flour and prepared flour mixes (-4.8 percent), and in the category of fresh biscuits, rolls, and muffins (-4.1 percent). Also down were prices for white bread (-1.9 percent). These were somewhat neutralized by increases in cereal (1.2 percent), and breads other than white (0.8 percent).

A comparison of June Food Consumed at Home for Maricopa County with index values for four selected metropolitan areas reveals that the outlays required to purchase a food group in June, 1980 (obtainable for $10.00 at 1967 average prices) were $23.79 in Maricopa County; $24.60 in Los Angeles-Long Beach; $25.06 in San Francisco-Oakland; $24.99 in Chicago-Northwestern Indiana; and averaged $24.80 in the United States.

INDEX FOR FOOD CONSUMED AT HOME
(Average 1967 = 100 percent)

Group	Maricopa County Sept. 80[a]	Maricopa County June 80[a]	United[b] States[b] June 80	Los Angeles Long Beach[b] June 80	San Francisco Oakland[b] June 80	Chicago Northwestern Indiana[b] June 80
Food Consumed at Home	249.5	237.9	248.0	246.0	250.6	249.9
Cereals and Bakery Products	231.7	229.1	245.9	253.1	253.7	254.1
Meats, Poultry, Fish, and Eggs	258.3	240.8	231.2	232.5	240.0	237.8
Dairy Products	213.7	210.3	227.2	220.4	221.2	219.7
Fruits and Vegetables	239.8	217.8	250.1	233.1	242.9	258.0
Other Foods Consumed at Home	275.7	268.0	301.8	299.3	309.4	302.1

[a]Computed from data contained in *The Consumer Price Index*, U.S. Department of Labor, Bureau of Labor Statistics, Washington D.C.
[b]Maricopa County food prices are reported for the month closest to publication.
[b]Comparisons of food prices among various cities and the United States average are made on the basis of earlier months because of the lag in collecting price reports from these other areas.
Note: Index comparisons between Maricopa County and the other regions show only that food prices in Maricopa County have increased more or less than food prices in the other regions since 1967. The indexes cannot be used to determine the actual differences in food price levels between the regions.
Source: Bureau of Business and Economic Research, College of Business Administration, Arizona State University, in cooperative cosponsorship with Valley National Bank.

Metropolitan Phoenix Consumer Price Index

THIRD QUARTER, 1980

Prices of consumer goods and services in the Phoenix metropolitan area rose 2.6 percent during the third quarter of 1980. This increase was higher than the second quarter rate of 0.1 percent, but much lower than the 6.9 percent jump of first quarter, 1980. The rise in prices for the Phoenix area is larger than the increase posted for the United States as a whole (1.8 percent), and higher than the rates for the comparison cities of Chicago (0.9 percent), and Los Angeles-Long Beach, which posted a decrease of 0.7 percent. Since the third quarter of 1979, the annual percentage change for Phoenix of 13.9 percent is higher than the 12.8 percent increase for the nation as a whole, and for Chicago (12.2 percent) but compares favorably with the Los Angeles-Long Beach increase of 13.7 percent.

The Consumer Price Index (CPI) for the Phoenix metropolitan area, on which these inflation measures are based, is prepared by the Bureau of Business and Economic Research, College of Business Administration, at Arizona State University. The quarterly CPI is based on comprehensive surveys conducted by the Bureau of Business and Economic Research in cooperative cosponsorship with Valley National Bank.

In the *Food* category, Food at Home rose 3.4 percent, the highest increase since the first quarter of 1979. An upsurge in Fruits and Vegetables (7.7 percent), coupled with a rise in Meats, Poultry, Fish, and Eggs (4.0 percent), is responsible for the higher rate of in-home food costs. Phoenix area Food at Home prices, however, compare favorably with the United States, Chicago, and Los Angeles-Long Beach averages of 4.0 percent, 3.4 percent, and 3.6 percent respectively. Food Away from Home prices also rose (3.1 percent) during the third quarter, up from the 2.8 percentage rate posted for the second quarter.

After the extreme first quarter high of 8.6 percent and the second quarter low of -1.0 percent, the price index for the *Housing* category resumed its more normal inflationary rate with a 2.5 percent increase for the third quarter, 1980. The annual percentage change for the Phoenix area was 15.8 percent. While this is higher than the United States figure of 14.8 percent and Chicago (12.0 percent), it compares favorably with the Los Angeles-Long Beach annual increase of 16.4 percent.

Although the third quarter increase in prices appears to contradict the United States quarterly rate of 1.6 percent and the decline for Chicago (-.04 percent) and Los Angeles-Long Beach (-3.0 percent), it must be noted that the third quarter for the Phoenix CPI begins in July and does not include the sharp drop in interest rates that occurred in June, 1980. The third quarter figures for the United States and the comparison cities cover the period from June to August because of delays in publication, while the quarter for Phoenix covers the standard July to September period. This one-month lag is responsible for the difference in *Housing* rates and should not be interpreted as a sign that Phoenix area housing prices are moving in direct contrast to the rest of the country.

The increase in *Housing* for the third quarter of 1980 in Phoenix is due mainly to a 3.5 percent rise in

homeownership costs. Contracted mortgage interest rates rose by 4.3 percent, and home purchase prices followed with a 3.7 percent increase over the previous quarter. Home improvement products such as painting supplies and masonry materials experienced sharp increases due to the large number of second quarter sales for these items. Fuel and Other Utilities rose by 2.6 percent because of higher costs of refuse collection.

Apparel and Upkeep rose at a quarterly rate of 1.6 percent. Increases in the cost of clothing, especially women's and girls', were offset by a sharp decline in footwear (-11.6 percent). The annual percentage change of 0.4 percent for *Apparel and Upkeep* is negligible in comparison with the United States as a whole (7.4 percent), Chicago (7.7 percent), and Los Angeles-Long Beach (11.8 percent).

Transportation in the Phoenix area posted a 1.9 percent increase for the third quarter. Although down from the second quarter annualized increase of 19.4 percent, the annual *Transportation* rate for Phoenix (16.6 percent) is higher than the rates of the nation as a whole (15.1 percent), and the comparison cities of Chicago (16.1 percent), and Los Angeles-Long Beach (12.8 percent). Private Transportation increased 1.5 percent over last quarter, with rising automobile insurance and repair costs tempered by relatively stable new car and gasoline prices, and declining used car and automobile financing charges. Sharp increases in both airline and interzone bus fares pushed the Public Transportation rate up to 8.5 percent, the largest quarterly increase for any major item within the overall index.

Medical Care prices in the Phoenix area rose by 3.8 percent during the third quarter. Of the seven major categories, *Medical Care* showed the highest quarterly increase due to sharp rises in hospital rooms and services and health insurance. This increase is larger than that posted by the nation as a whole (1.9 percent), Chicago (1.5 percent), or Los Angeles-Long Beach (0.9 percent). The annual rate of change of *Medical Care* in Phoenix (16.1 percent) is also higher than the United States (11.0 percent), and Chicago and Los Angeles-Long Beach (13.0 percent and 12.4 percent respectively). In 1980, Phoenix has been consistently higher in terms of annual percentage increases in the category of *Medical Care* than the rest of the country and the comparison cities.

Entertainment costs rose 2.3 percent during the third quarter. While this rise is higher than last quarter's increase of 0.6 percent, it is much lower than the 8.8 percentage jump of the first quarter, 1980. Higher costs for musical instruments and music lessons, pet and photography supplies, and higher admission fees to sporting events are responsible for this third quarter increase.

Other Goods and Services rose by 2.8 percent during the third quarter. This increase is larger than that for the United States (1.6 percent), Chicago (1.4 percent), or Los Angeles-Long Beach (0.5 percent). On an annual basis, however, the Phoenix area percentage rate of 7.0 percent is lower than the rest of the country (8.9 percent), Chicago (10.6 percent), and Los Angeles-Long Beach (9.4 percent). Third quarter increases were due mainly to higher costs of private elementary and high school tuitions, legal and funeral services, and (among Personal Care items) beauty parlor services.

(See table on opposite page for Complete Consumer Price Index for Metropolitan Phoenix with selected comparisons.)

METROPOLITAN PHOENIX CONSUMER PRICE INDEX
THIRD QUARTER, 1980
(1969 = 100)

Group	Second Quarter 1980 Index	Third Quarter 1980 Index	Percentage Change from Last Quarter	Percentage Change from One Year Ago
ALL ITEMS	222.6	228.4	2.6	13.9
Food and Beverages	217.0	224.2	3.3	11.3
Food	222.4	229.7	3.3	11.5
Food at Home	232.9	240.7	3.4	10.5
Cereal and Bakery Products	231.3	236.2	2.1	12.0
Meats, Poultry, Fish, and Eggs	218.7	227.5	4.0	5.4
Dairy Products	204.1	207.6	1.7	8.9
Fruits and Vegetables	209.6	225.9	7.7	12.2
Other Food at Home	228.4	234.1	2.5	14.6
Food Away From Home	192.3	198.1	3.1	13.2
Alcoholic Beverages	147.6	153.1	3.8	9.8
Housing	222.6	228.2	2.5	15.8
Shelter	230.5	237.4	3.0	18.2
Rent, residential	175.7	177.5	1.0	7.3
Homeownership	239.2	247.4	3.5	20.7
Fuel and Other Utilities	245.7	252.0	2.6	14.0
Household Furnishings and Operations	187.0	187.9	0.5	6.4
Apparel and Upkeep	170.2	172.9	1.6	0.4
Apparel Commodities	163.9	164.5	0.3	-2.0
Men's and Boys' Apparel	148.7	150.9	1.4	6.1
Women's and Girls' Apparel	157.1	165.1	5.8	-5.9
Footwear	215.8	190.7	-11.6	-10.0
Transportation	238.0	242.6	1.9	16.6
Private Transportation	237.3	240.9	1.5	15.9
Public Transportation	248.9	270.0	8.5	27.1
Medical Care	299.0	310.4	3.8	16.1
Entertainment	183.4	189.1	3.1	10.6
Other Goods and Services	213.4	218.4	2.5	7.0
Personal Care	210.3	216.1	2.8	10.2

Source: Bureau of Business and Economic Research, College of Business Administration, Arizona State University

	United States		Chicago		LA Long Beach	
Group	Percentage Change From Last Quarter	Percentage Change From One Year Ago	Percentage Change From Last Quarter	Percentage Change From One Year Ago	Percentage Change From Last Quarter	Percentage Change From One Year Ago
ALL ITEMS	1.8	12.8	0.9	12.2	-0.7	13.7
Food	3.3	9.5	2.7	10.4	2.9	9.9
Food at Home	4.0	9.6	3.4	10.5	3.6	11.6
Food Away From Home	1.9	9.3	1.3	10.2	1.5	7.0
Housing	1.6	14.8	-0.04	12.0	-3.0	16.4
Shelter	1.1	16.2	-1.7	12.2	-4.9	17.1
Fuel & Utilities	4.0	16.0	7.8	14.8	10.9	29.3
Household Furnishings & Operations	1.5	8.4	1.1	9.1	0.2	7.1
Apparel and Upkeep	0.6	7.4	2.2	7.7	0.6	11.8
Transportation	1.5	15.1	0.2	16.1	0.6	12.8
Medical Care	1.9	11.0	1.5	13.0	0.9	12.4
Entertainment	2.0	9.4	2.0	11.0	3.4	9.7
Other Goods and Services	1.6	8.9	1.4	10.6	0.5	9.4

Source: Metropolitan Phoenix data compiled by the Bureau of Business and Economic Research, College of Business Administration, Arizona State University; other data from U.S. Department of Labor, Bureau of Labor Statistics, Washington, D.C.